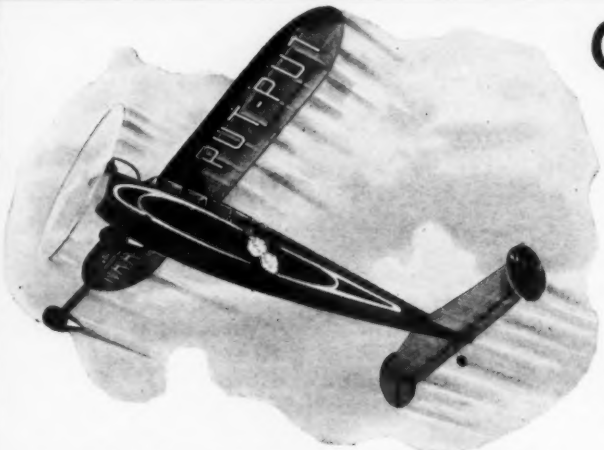
MODEL AIRPLANE NEWS

10th Year of Publication

FEBRUARY, 1939
20¢

Curtis Fighter XP-40

(See Page 8)



An actual photograph of the original model on a Test Flight.

GAS TYPE

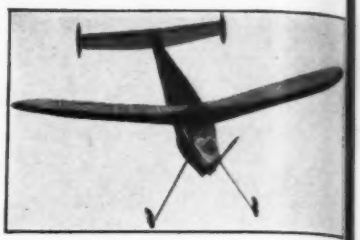
With the distinctive features that mark this a typical gas model. You get the real "gas model feel" when flying this job.

MOTOR 'PUT'

Not just the ordinary dull throb but a true motor "put" that is radically different.

and RUBBER POWER

To get it up fast and to drive the motor "put" there is an unusual optional feature to give the extra flying time that is always found in "Burd" Models. The one bladed, dynamically balanced propeller, with a fold back, "no drag" feature, is included in the design for this super-modern flyer.



CONTENTS

- ★ Full size plans, entire wing length shown, complete detail sketches.
- ★ Modern hardwood wheels, including tail wheel.
- ★ Soft, clear balsa blocks for shaping.
- ★ American spring steel wire.
- ★ Husky rubber band for power unit.
- ★ Ready turned dummy motor.
- ★ More than enough "BURD" glue and paper cement.
- ★ Selected and graded strip and sheet balsa with glass smooth finish.
- ★ Fine, hair-line printed wood.
- ★ Fine "AA" silk covering tissue.
- ★ Large, true-screw, semi-finished prop.
- ★ Material and directions for "motor put."

Special Quality Additions for 'Burd' Flying Models →

80 ft. Bundle Contest Rubber.....40c
Pair 1½" M & M Air Wheels.....50c
Balsa Semi-Shaped Prop Blank....30c

Can be had for Put-Put, Skeeter or Korda's World Record Holder. State which when ordering.

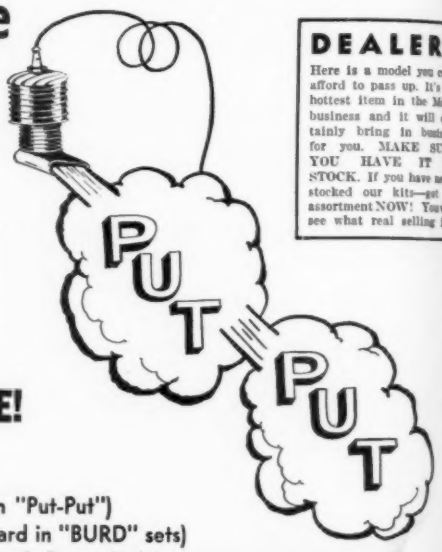
Finished Hardwood Propellers

9"	23c
10"	30c
12"	35c
14"	65c
16"	90c

Balsa Propellers

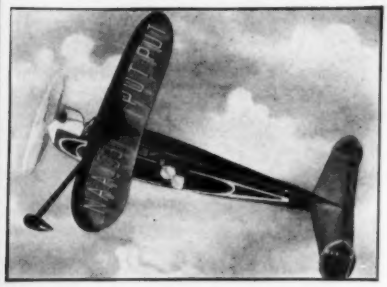
9"	9c
10"	10c
12"	12c
14"	14c
16"	16c
Blade for one bladed prop.	10c

the



DEALERS

Here is a model you can't afford to pass up. It's the hottest item in the Model business and it will certainly bring in business for you. MAKE SURE YOU HAVE IT IN STOCK. If you have never stocked our kits—get an assortment NOW! You will see what real selling is.



EASILY WORTH THREE TIMES OUR PRESENT PRICE!

Compare!!

- ✓ SIZE ("Put-Put" is 36")
- ✓ COMPLETENESS (nothing else needed in "Put-Put")
- ✓ QUALITY (Finest money can buy is standard in "BURD" sets)
- ✓ QUANTITY (No set has ever given as much for so little)
- ✓ DESIGN ("BURD" sets the pace for endurance flying models)

with *guaranteed*

36" WINGSPAN **ABSOLUTELY COMPLETE IN EVERY RESPECT!!**

75c ADD 15c POSTAGE

'BURD' FLYING ENDURANCE!

All Orders Filled Same Day

THE TYPE OF FLYING SATISFACTION THAT NO ONE HAS EVER EQUALED!!

GENUINE PROVEN BUILT-IN ENDURANCE!

"BURD" with Korda's World Record Holder, the skeeter, and the thermalider, shows the way for *endurance* flying models. Contests all over the world are all won with "BURD MODELS"! Get in the swim. ORDER *your* "BURD MODEL" TO-DAY!

FOREIGN AGENTS WANTED: The development of model building over the world is rapidly reaching a large volume. Progressive dealers in foreign countries are desired.

BURD

MODEL AIRPLANE COMPANY

2113-2117 EAST OLIVER STREET BALTIMORE, MD.

In England: Elite Model Planes, 14 Bury New Road, Manchester

BURD MODEL AIRPLANE CO.,
2113-2117 E. Oliver St., Baltimore, Md.

Please send me the following at once, for which I enclose money order for ..... (No COD's accepted).

☐ NEW COMPLETE PICTURE LIST OF ALL TYPES, 3c

☐ 36" Put-Put gas type model.....$1.00
☐ 36" Skeeter, with floats, wheels and skis 1.00
☐ 43" Korda's World Record Holder..... 1.00
☐ 30" Thermalider Endurance Flyer..... .50

Five New 30" Fyling Models 50c Each

☐ Vought SBU-1
☐ Curtiss Jenny
☐ Lockhead Vega, with floats
☐ Fairey Battle
☐ Beechcraft

☐ 80 Ft. Bundle Contest Rubber.....40c
☐ Pair 1½" M & M Air Wheels.....50c
☐ Balsa Semi-Shaped Prop Blank.....30c
(state the type of model you intend to use it on)

Finished Hardwood Propellers

☐ 9" .....
☐ 10" .....
☐ 12" .....
☐ 14" .....
☐ 16" .....

Balsa Propellers

☐ 9" .....
☐ 10" .....
☐ 12" .....
☐ 14" .....
☐ 16" .....
☐ Blade for one bladed prop.....

Name .....

Address .....

City ..... State .....

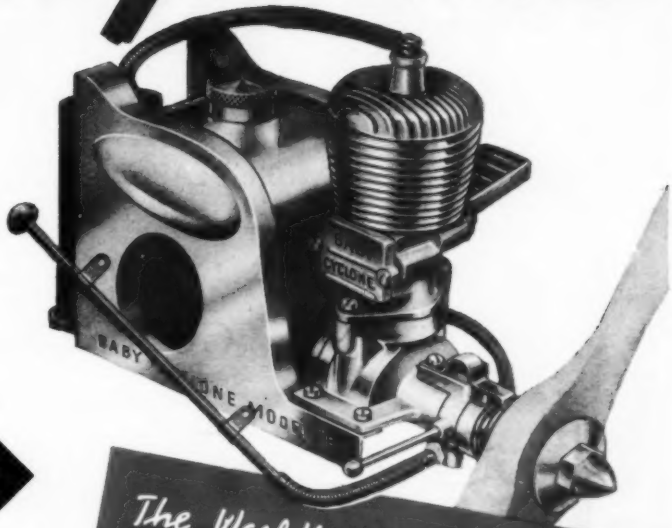
ALL FOREIGN COUNTRIES ADD 25c TO ORDER

Baby Cyclone

THE

ONLY ENGINE

TO ACCOMPLISH
THESE THREE GREAT FEATS



WORLD'S OFFICIAL ENDURANCE RECORD

Baby Cyclone powered model established the OFFICIAL N.A.A. sanctioned and certified World's endurance record of 2 HOURS, 1 MINUTE and 54 SECONDS; breaking the previous record by 40 minutes and 51 seconds!

WORLD'S WIDE OPEN THROTTLE RECORD

More than 100 hours continuous run with wide open throttle! No other engine has ever equalled Baby Cyclone's supreme performance in this gruelling test of materials, engineering and precision manufacture.

THE 1937 CHAMPION OF ALL NATIONS

Baby Cyclone completely dominated the 1937 season. Its great succession of victories, made under widely differing conditions, offer absolute proof of Baby Cyclone's ability to win meets for you!

The World's Greatest Value!

REGULAR PRICE $12.50

YOUR TEMPORARY PRICE

$9.00

for the 1938 Model "F" BABY CYCLONE

The BEST *and* ONLY *engine we build!*

The full resources of Aircraft Industries have been concentrated on building one engine and building it RIGHT. The sensational low temporary price is not the result of cheapening the materials or construction of a more expensive model. It is the same engine that has established these three great records. You make this saving by buying direct from the factory, whose production methods and tremendous volume of sales permit us to offer you a high quality motor for the lowest price.

Complete and assembled with coil, condenser, drawn steel engine mount, integral gas tank, remote control throttle, exhaust manifold and can of lubricating oil. Every engine block tested and given full throttle run. Fully guaranteed against defective materials or workmanship. Postage prepaid in the U.S.A. Buy direct; we have no dealers in the U.S.A. Price in all foreign countries $18 for the duration of this offer.

CYCLONE SERVICE YOUR ENGINE POSITIVELY WILL BE SHIPPED ON SAME DAY YOUR ORDER IS RECEIVED.

ORDER BLANK -- USE TODAY -- DON'T DELAY

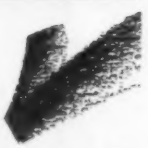
AIRCRAFT INDUSTRIES, GRAND CENTRAL AIR TERMINAL, GLENDALE (LOS ANGELES), CALIFORNIA

PLEASE SEND ME POSTPAID THE FOLLOWING ITEMS CHECKED. I ENCLOSE **POST OFFICE MONEY ORDER.**

○ **BABY CYCLONE MODEL "F"** — Completely assembled as described above. REGULAR PRICE $12.50— **TEMPORARY PRICE** **$9.00**

○ **BABY CYCLONE PROPELLER** — Specially designed to operate with Baby Cyclone at peak efficiency. Tested and balanced. It is advisable to have two or three of these propellers on hand. REGULAR PRICE $1.50— **TEMPORARY PRICE** **$1.00**

○ *Extra Special* Combination BABY CYCLONE Model "F" Propeller and "Chief" Kit. **Regular Price $19.00 TEMPORARY PRICE** **$12.50**



SHIP TO _____ Age ____ ADDRESS _____ N-12

BUY NOW--BEFORE PRICE ADVANCES

Model AIRPLANE News

10th YEAR OF PUBLICATION

VOL. XX *No. 2*

Edited by Charles Hampson Grant

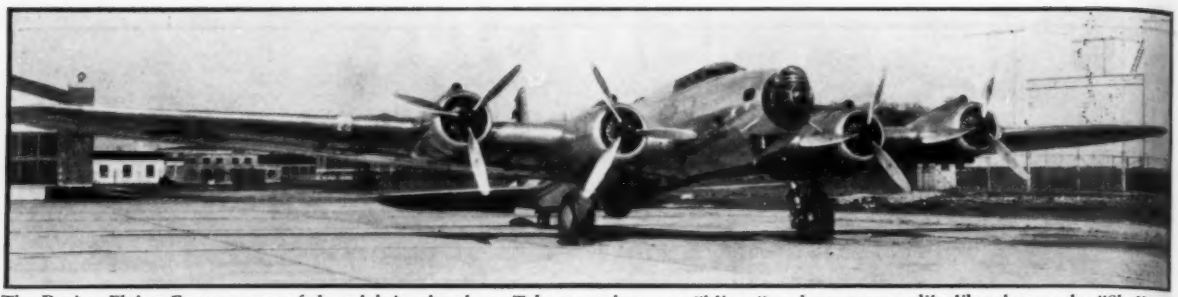
CONTENTS

FEBRUARY, 1939

NOTICE

Published Monthly by JAY PUBLISHING CORP., Mount Morris, Illinois.
Editorial and General Offices, 551 Fifth Avenue, New York City.
George C. Johnson, President. N. Howard Williamson, Secretary.
Jay P. Cleveland, Advertising and Business Manager, 551 Fifth Avenue, New York, N. Y.
Entered as second-class matter Dec. 6, 1934, at the post office at Mount Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N. Y.

Price 20c a copy. Subscription price $1.65 a year in the United States and its possessions; also Cuba, Mexico and Panama.
$1.65 in Canada. All other countries $2.50 per year.
Contributors are especially advised to be sure to retain copies of their contributions, otherwise they are taking unnecessary risk. Every possible effort will be made in our organization to return unavailable manuscripts, photographs and drawings (if accompanied by postage), but we will not be responsible for any loss of such matter contributed.



The Boeing Flying Fortress, one of the mightiest bombers. Take away her nose "blister" and one can readily liken her to the "Skyliner"

On a swivel mount, this gun in a Waco fighter is ready for action

HIDDEN

How New Secret Developments and Commercial Planes Will Contribute to the Defence of America

THERE'S a story behind America's Air Defense that is seldom told. It is a story of preparedness that comes to light only when one can see with his own eyes the great transformation which takes place.

Not long ago a group of Wright Field test pilots—men who know planes better than those who build them—were out front at operations "talking shop." What they had to say threw a change of light on the whole of America's air defense, for it led to our true discovery of the "army's hidden wings."

One of them spoke above the rest.

"America's air defense is not entirely dependent upon military airplanes," he said. "There are great numbers of commercial planes which can be converted into fighters, attack ships and bombers should the occasion arise. In fact, there is very little difference between the two if one cares to compare their outward appearance. Uncle Sam's military planes of today look very much like the commercial planes which take to the air."

This statement was followed by others:

"America may not have the largest air force in the world, but she is equipped to build one that is," another pilot asserted.

A third advanced, "The theory of efficiency in the air is not based on quantity but on quality. Therefore, experimentation is the secret of superior air power."

These were just casual statements—unofficial of course,—but they set one to thinking seriously about this problem of air defense. A person could not help but visualize some of America's air power as it is today. There came into mind:

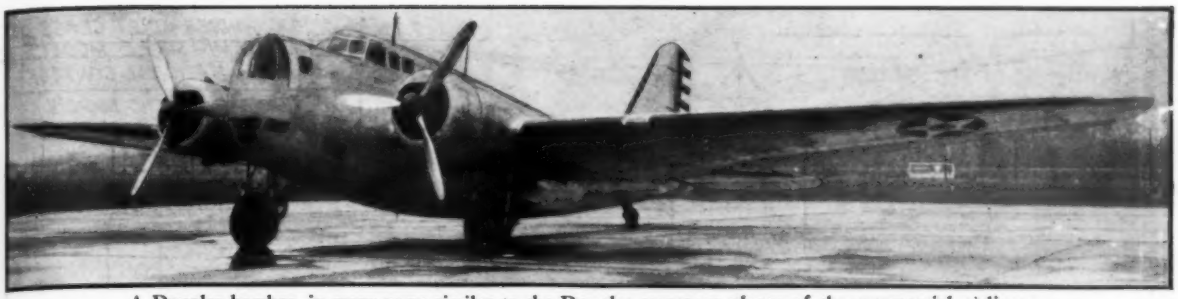
THE BOEING FLYING FORTRESSES, the army's giant bombers. Recently they proved their superiority in the air by completing the longest mass flight of land planes on record when they flew from Langley Field in Virginia to Buenos Aires in South America with only one stop. The army has thirteen of these giants and more are under construction.

Capable of speeds close to three hundred miles per hour or more, these planes carry great loads of explosives and have a cruising range of four thousand miles. One of them could destroy a great city with its load of bombs.

But even the superior qualities of the Flying Fortress only partly satisfied the world's toughest customer when it came to buying planes for his air armada and for this reason was born the BOEING B-15, the latest addition to the army's bombardment group.

The Waco fighter has great maneuverability and has served in the air forces of South American countries

The Bell "Aircuda," the U.S. Army's challenge to attacking bombers



A Douglas bomber, in many ways similar to the Douglas transport planes of the commercial airlines

WINGS of THE ARMY

By Douglas J. Ingells

Still undergoing tests at Wright Field in Dayton this ship is truly the world's largest bombardment plane. Her one hundred and fifty foot wing span almost dwarfs the great wings of the Flying Fortress as they stand side by side on the line. A crew of nine is accommodated in her cabin, which looks more like the inside of a large airliner than the interior of a bombing plane. There is a kitchenette where the crew can do its own cooking. There are berths for sleeping quarters should the plane be used for long distance flights.

Outwardly the giant has four motors and is equipped with the most modern three-bladed propellers, now in use almost exclusively in military planes. She is equipped with three auxiliary motors within her interior, however. These operate her own generator which supplies electric current for the ship. One of them also supplies motive power for an intricate mechanism developed to aid in the control operations.

An interesting feature about the ship is its giant wing. From most reports one would believe it to be all-metal; however, only the front edge of the wing is actually metal, the rest (the trailing edge) is fabric covered. The wing, however, according to both factory and army engineers, is classified as being an "all-metal" wing. The elevators on the ship are almost as large as the wing on a small pursuit ship. This gives one an idea of the giant's true size.

The plane weighs thirty tons and can carry several tons of bombs in addition to her crew and supplies. All of these explosives can be released at one time as well as individually. The bomber has a cruising range of six thousand miles—meaning she could fly almost to Europe and return without once refueling or coming down to rest.

The speed of the plane has not yet been released; partially because tests are still in progress but mostly for the reason that army regulations do not permit the release of such data. However, as an illustration, the plane flew the distance from Cincinnati to Dayton in approximately twelve minutes. It is fifty-four miles between the two cities, which gives the bomber an estimated speed of two hundred seventy miles per hour. Even then there is no way of telling whether the ship was being "pushed" or not. Three hundred miles an hour might be as good a guess as any. That is really traveling, considering the plane is the largest of its kind in the world.

The B-15 appears to be the most complete of all bombers. She has no "blind spot" and has the greatest amount of protection yet fitted into any military bomber belonging to Uncle Sam.

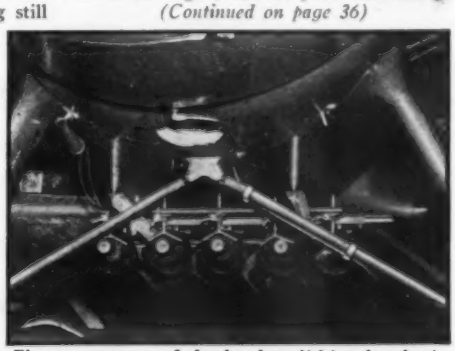
Because of their high speeds and flying qualities it has been necessary for army aeronautical engineers to keep pace with the streamlined bombers by designing still faster pursuit and attack planes to insure the giants of ample protection and also to ward off any possible attacks by "unknown" similar high speed planes of an imaginary enemy. Thus, a great change has taken place in pursuit aviation.

Probably the most unique addition to the attack group is the XFM-1 better known as the AIRACUDA. This is a low-wing pusher type plane and from all reports it has proved to be about the "best yet in military airplanes." It is equipped to carry light bombs and is armed with six machine guns; more powerful armament than has ever before been used on a fighter. It carries a crew of five; pilot, co-pilot, radio operator and two gunners.

The Airacuda is capable of speeds in excess of those attained by the bombers and has many new streamline features. There is an auxiliary power plant used for retracting its wheels while in the air. This is a new development in the field of aviation. The gasoline is carried in the wings, which eliminates dangers of any fire hazards.

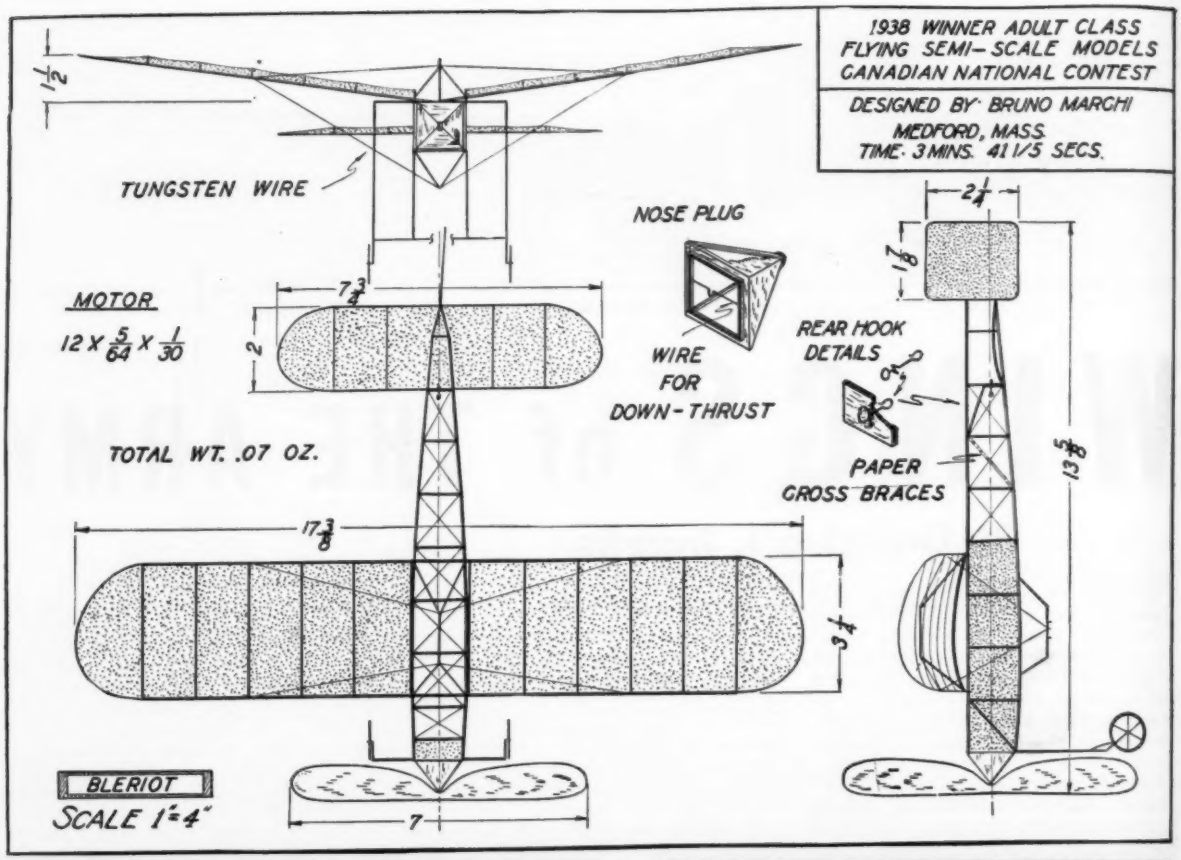
An innovation in this plane is the interchangeability of any or all members of its crew. The wing gunners can travel between their stations and the main fuselage while in flight; the co-pilot can change

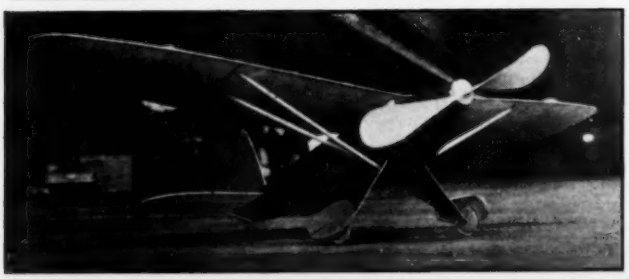
(Continued on page 36)

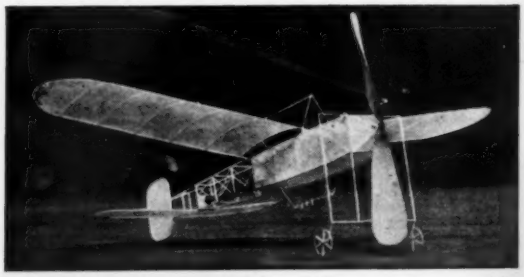


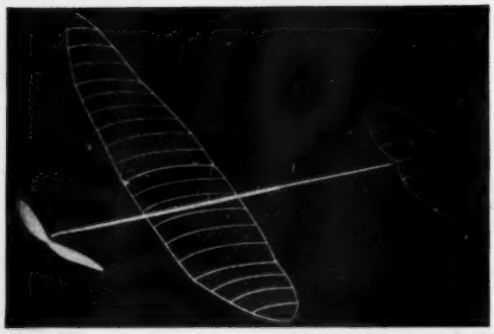
Five messengers of death; demolishion bombs in the racks of a Waco fighter

The Curtiss XP-40 pursuit plane. It has a speed of nearly 400 m.p.h.









Above Left: A flying semi-scale ship, weighing 1/5 oz., by Jeff Harris

Above: Bruno Marchi's winning flying semi-scale Bleriot channel plane, in the adult class

Extreme Left: Bruno Marchi and Wilbur Tyler of the J.A.L. with their first place awards.

Left: Tyler's winning indoor stick model

Left: A modified Grant Wakefield, one of the best performers at the contest

A scale gas model of the Westland Lysander that was sensational

Canadian Model Matters

By ALBERT L. LEWIS

UNTIL a few years ago, Canada—to most American modelers—was a northern wasteland inhabited by gold miners, Mounties who always got their man, and a few staunch fellows who built and flew Baby R.O.G's.

When our national contests betook themselves westward to St. Louis, Akron and Detroit and the Canadian contestants had a chance to show their wares, it became apparent that while we may have been right about the gold miners and Mounties, the few staunch fellows with Baby R.O.G's. were really thousands of skilled aero modelers who were just as good as we.

The climaxing blow, of course, was the Canadians taking home from Detroit this year our gleaming Moffet trophy. The pirate band was led by one Roy Nedler whose ship placed first to the tune of "It's a cinch!"

His curiosity aroused by Canadian ability and spurred on by Massachusetts' Bruno P. Marchi, who has competed in the last three Canadian National battles, this correspondent resolved to take himself to Toronto to witness Canada's '38 National Contest and get the low-down on the Dominion's place in the model aeronautics field.

Herewith is an eyewitness account:

There is as much interest in model matters up northward as there is in the "States." Since the armories are all controlled by the government and are rather difficult to secure for indoor flying meets, emphasis is placed on outdoor models, with the gas "bug" sweeping the country from Vancouver to Halifax.

For the most part rules and events are patterned after those of the N.A.A. with several exceptions. Adult interest is evident, with the oldsters entered in all the contests and giving the younger enthusiasts a battle for top honors.

The Model Aircraft League of Canada is the governing body which formulates the contest rules and keeps tab on national Canadian records. It is more of an advisory group than an active leader, preferring to have the various clubs throughout the provinces conduct their own activities. A rules committee made up of leading modelers from all of Canada, is charged by the M. A. L. C. with rule changes. All in all, the present set-up seems to be working out quite well.

One great difference in northern model affairs is the lack of sponsors for clubs. Unlike the United States, there are few large department stores or other businesses and civic organizations eager to form model builders clubs and promote meets with worthwhile prizes. With the exception of the National Meet in Toronto which is sponsored each year by the Canadian National Exhibition, and the Toronto city championships held by the T. Eaton Company (largest retail organization in the British Empire), sponsored meets with valuable prizes are few and far between.

Because of this, Canadian aeromodelers are accustomed to forming their own groups, promoting their own prizes and governing themselves. An excellent example of this is the Canadian Gas Model Club with headquarters in Toronto, which is now attempting to unite all gas groups in the provinces and standardize rules, events and contest dates. Apparently an admirable purpose, the C.G.-M.C. under the energetic leadership of Don Jacobs, hopes to make the gasoleers a strong body which will be a powerful factor in future model activities "Up North."

In the rubber-powered field, instead of permitting outdoor cabin ships to range from 100 to 300 square inches in wing area, all contest entries conform to Wakefield rules. This creates a tremendous amount of interest in the Lord Wakefield International contest and at next year's Wakefield meet in America, the Canadians should give a good account of themselves and may walk away with another international award.

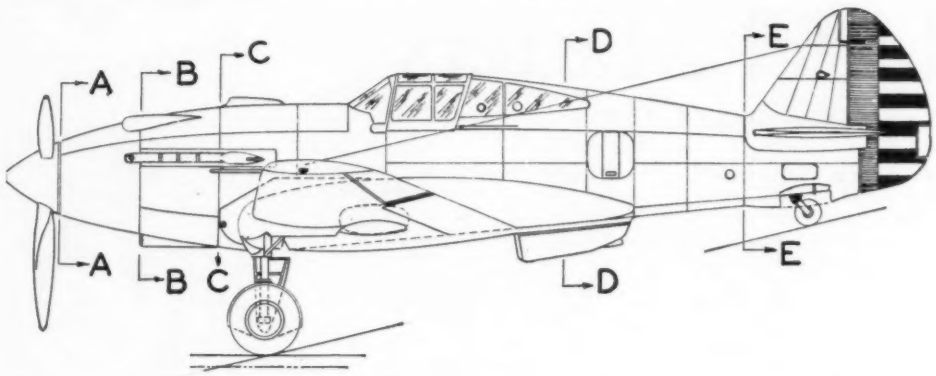
A definitely different event is one held for flying semi-scale indoor models. The rules governing this event are: "A model of this type is a replica of a man-carrying aeroplane, with minor changes in design

(Continued on page 46)

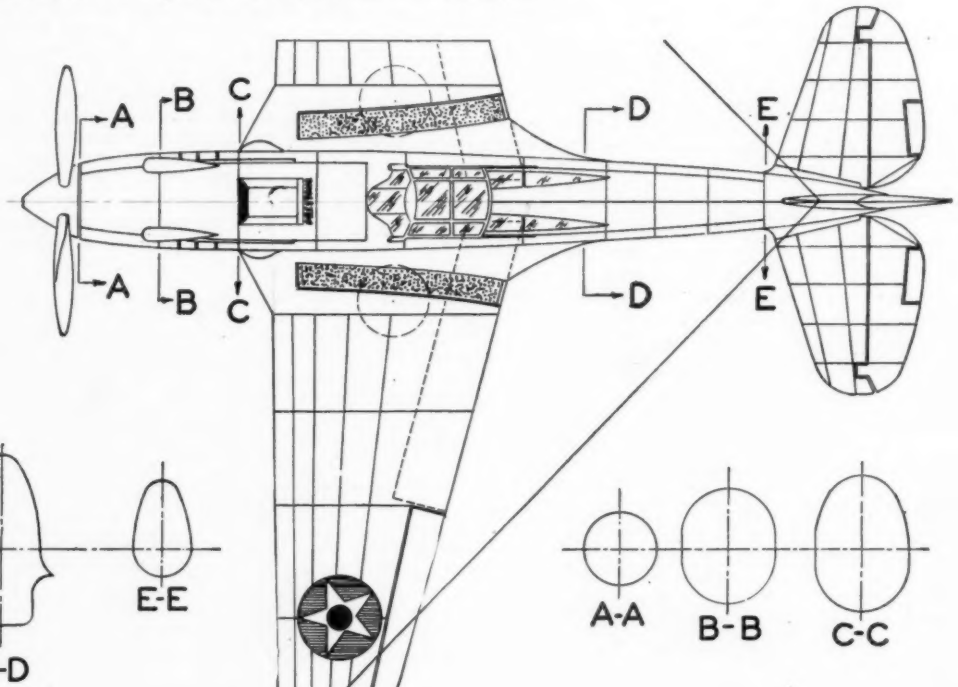
John Dilly of Galt, Ont., and his Wakefield entry. He is one of Canada's best-known builders

Contest Director Ted Booth, seated, is cheerful and well-liked despite the scowl

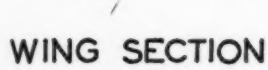
CURTISS XP-40
WORLD'S FASTEST PURSUIT PLANE



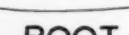
ALLISON LIQUID-COOLED ENGINE



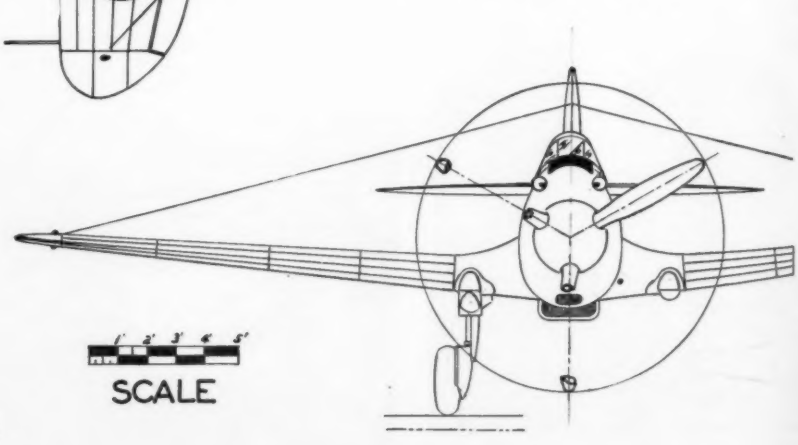
WING SECTION



ROOT



TIP



SCALE

ROBERT MCLARREN

392 PER— in the CURTISS XP-40

THE PLANE ON THE COVER

By ROBERT McLARREN

Here is Uncle Sam's latest and most deadly air weapon. It will climb 6000 feet in a minute. (U.S. Army Photo)

UNCLE SAM in his relentless search for an aerial article of horror, a plane with such ghastly striking power that all who behold it will be stricken with the pervading atmosphere of lancing, slashing death that it exudes, has searched not for a ship which represents a dynamic leap into the blind space of destiny's future but a conventional, inexorable, progressive modification of an accepted type which has proven itself capable in actual service.

He has demanded, naturally, a craft of proven structure and design. But he has commanded also that that strange fruit of engineering dreamers' designing genius bear a meat of scientific superiority over those other nations of the world. Through the closest kind of cooperation by three of our land's most important national defense agencies—the United States Army Air Corps, the Allison Engineering Company and the venerable Curtiss Airplane Company—Uncle Sam now has that dream painted in shocking reality: a fighter of such wickedness he has analyzed his own dreams for it with amazed tolerance.

It is with a great deal of pride that we present our plane on the cover this month: the Curtiss XP-40 single-seat pursuit-fighter. The reason for that pardonable pride is obviously evident, for we are hereby the agency of introduction of this new ship, the hosts at the XP-40's "coming out party." It is generally known the impentrable shroud of secrecy which invariable veils newly developed and experimental items for our national defense. But the present volcanic rumblings of international unrest the world over makes it imperative that those nations which might be singed by the explosion exhibit their strength, their power of defiance, in a last effort to stave off the catastrophe. Such was the mighty Air Force of Germany in the Czechoslovakian crisis and such is our own Army Air Corps in the present and even more fearful and pregnant crisis.

None of the most boisterous bullies in the corner tavern dare attack or even tread upon the toe of the giant who stands apart, whose magnificent torso, flexed biceps and sinewy cords of muscle are displayed. Neither shall Germany, Italy nor Japan flagrantly violate Uncle Sam's sanctity when his weapons of battle are laid bare.

Hence the shedding of that tight barrier of secrecy surrounding experimental military units by our governmental agencies. The East and the West must know of our power; they must be made aware of our strength. And thus the release of photographs, the distribution of information and our presentation of the Curtiss XP-40 this month. May it serve its purpose!

The Curtiss Air Corps XP-40 is the latest modification of a proven type and is the present ultimate development of the original Curtiss Model 75 single-seat pursuit plane. Construction follows conventional all-metal cantilever design. In comparison with the XP-37, described in the May 1938 issue of MODEL AIRPLANE NEWS, we see that several radical and efficacious alterations have been applied, chief of which is the abandonment of the exhaust-driven General Electric centrif-

(Continued on page 53)

A Word To The Wise

How To Win Meets and Influence Judges

Compiled by the "Instructor"

AN ASK-Me-Another for the mentally alert: What should be on every outdoor model besides a fervent hope? (Delv through the dots below for the answer.)

LISTEN, Chum: It's not sissy to sleep the night before a contest .... if you heed the wise ones you'll not try to wile the preceding eve away constructing your crates .... instead, they'll be completed long in advance of the starting signal .... It's a fact: Lots 'n' lots of meets are won at home—by models being in readiness, rubber motors made up and by including such simple little items as an extra prop or two in your model box .... Principally about props: Have various sized ones along for each indoor entry—different flying conditions demand different props .... When you dash out to set a new national mark with an indoor craft remember to take along rubber of varying sizes (differing by as little as 1/64-inch) so you can try various sizes as well as short and long loops .... And for setting that new record you'll want a familiar, tested design. When there's hardware at stake (cups 'n' trophies, to you, sonny) the expert doesn't experiment with untried, freak designs .... Continuing with this common-sense theme: Use strong wire for free-wheeling, hooks, shafts, landing gear and sech on outdoor ships, so a few extra turns on the field of honor won't demolish your handiwork .... Just any old hunk of rubber won't do, either, to hold the wing onto the fuselage; for that binding elastic takes a beating whenever the model cavorts about in mid-air .... Weak rubber will permit the supporting surface to rise off the fuselage or stick and then you'll be sorry when the craft tailspins in! .... Two other suggestions: (1) Have a reliable fastening system for holding the tail surfaces onto the fuselage, else the surfaces are thrown out of adjustment with every landing the model makes. (2) When designing that super-soarer job pull-leeze don't shade specifications too closely! By allowing a little leeway you'll save much arguing with checkers at contests ....

ANSWER TO THIS MONTH'S QUERY: Why, your name, address and telephone number, of course! And if you're competing in an away-from-home meet include your temporary address, too (even if it's the waste barrel at the corner of Spruce and Juice) .... With crates complete and carefully packed for the big doin's, be certain to bring along your own winder (so you won't spend half the day trying to find or borrow a friend's), your own gas, oil, rubber, extra batteries and scraps of balsa, hardwood, patching material, et cetera (for many a meet has been won by a plane considerably battered on the initial flight, but which was repaired during the fray) .... These "crash-insurance" items should be kept in a

(Continued on page 42)

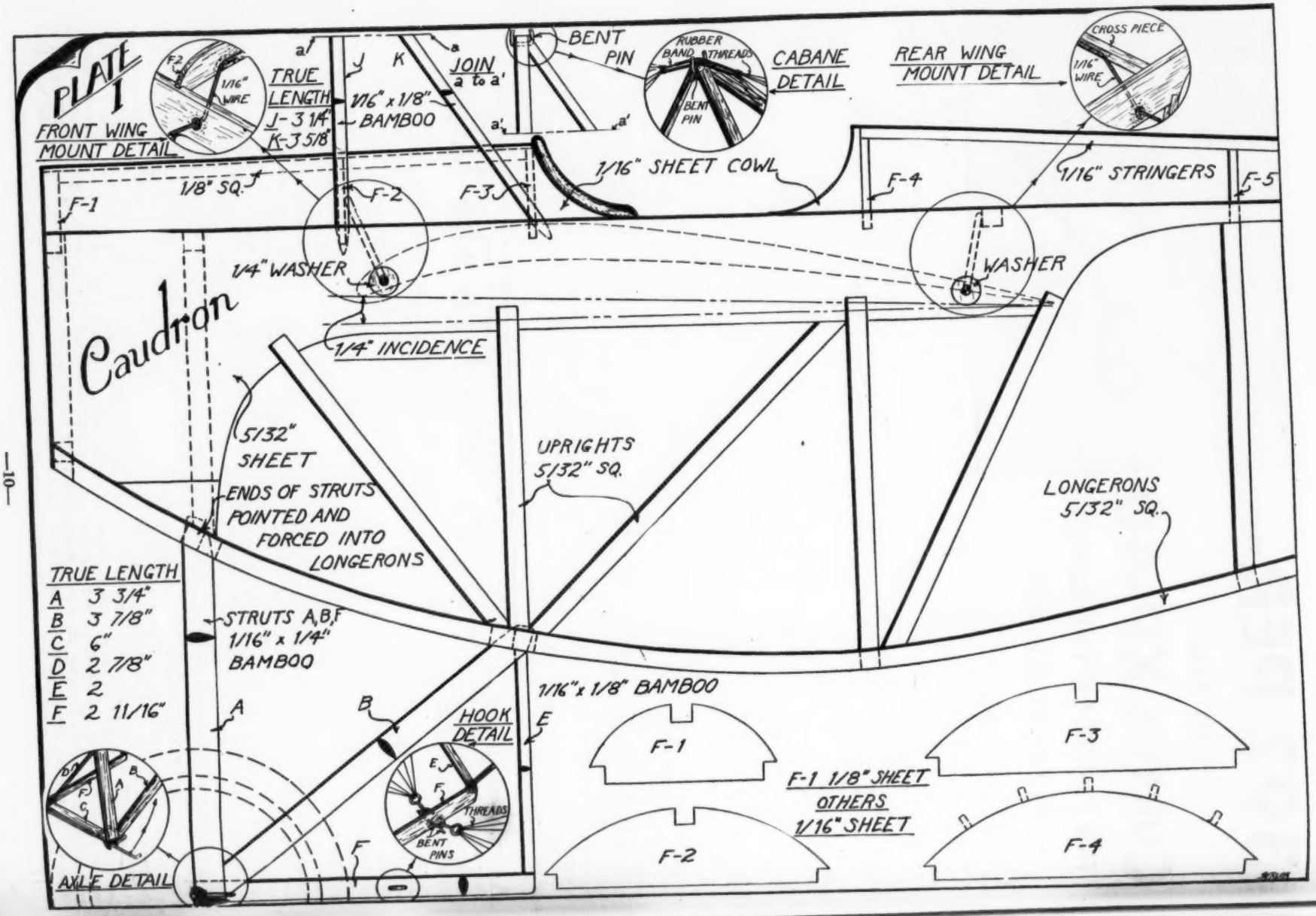
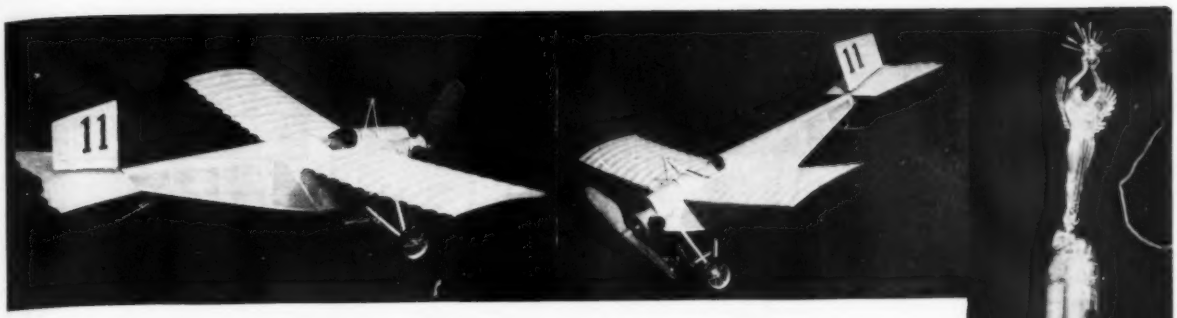


PLATE 1
FRONT WING MOUNT DETAIL
F2
1/16" WIRE
TRUE LENGTH
J- 3 1/4"
K-3 5/8"
a'
J
K
a
JOIN a to a'
1/16" x 1/8" BAMBOO
BENT PIN
RUBBER BAND & THREADS
BENT PIN
CABANE DETAIL
REAR WING MOUNT DETAIL
CROSS PIECE
1/16" WIRE
1/8" SQ.
F-1
F-2
F-3
1/16" SHEET COWL
F-4
1/16" STRINGERS
F-5
1/4" WASHER
WASHER
Caudron
1/4" INCIDENCE
5/32" SHEET
ENDS OF STRUTS POINTED AND FORCED INTO LONGERONS
UPRIGHTS 5/32" SQ.
LONGERONS 5/32" SQ.
TRUE LENGTH
A 3 3/4"
B 3 7/8"
C 6"
D 2 7/8"
E 2
F 2 11/16"
STRUTS A,B,F 1/16" x 1/4" BAMBOO
1/16" x 1/8" BAMBOO
A
B
E
HOOK DETAIL
F
AXLE DETAIL
BENT PINS
THREADS
F-1
F-2
F-3
F-4
F-1 1/8" SHEET
OTHERS 1/16" SHEET



THE "FLYING SCALE" NATIONALS WINNER

Two views of the remarkable model and the national trophy that it won at the 1938 National Competition

How You Can Build the Super-Detail Model of the Caudron Monoplane That Outflew All Other Contenders

By HENRY STRUCK

UNDER the rules governing the Flying Scale Event at the National Meet, a model to be eligible had to be ". . . an exact replica of a man-carrying machine every part being proportional to the corresponding part of the larger machine. No part of the model may be made larger in proportion to improve performance. The propellers must conform to the original, but may be altered in blade width and pitch."

Now add to this a weight rule of three ounces per hundred square inches of wing area, R.O.G. launching, points for workmanship and detail and you have the ingredients of a really tough but interesting contest.

The Caudron on its way to victory

With the great majority of flying scale model plans or kits doctored in just such fashion as would make them immediately ineligible, the only solution seemed to be to construct a full size ship exactly like a contest model and make a replica of it. This happy thought appearing somewhat impractical, we undertook an intensive hunt for a ready-made airplane with the desired characteristics.

It was not until we had gone back as far as the 1911 types that a fully satisfactory design was unearthed. First of all, the large prop whose diameter was 1/3 the wing span, the comparatively small wing area requiring a low total weight and the long rubber line possible, promised performance. Second, the bellied fuselage lowered the center of lateral area to increase spiral stability; while the combination of long tail moment arm and ample tail surface assured longitudinal stability. Last, but not least, the abundance of detail such as spoke wheels, wire rigging, dummy motor, etc., made the ship one to catch the eye.

This was the Caudron! A tiny ship whose monoplane wing spread a scant twenty-four feet. Powered by a four-cylinder air-cooled motor, a speed in the neighborhood of 75 miles per hour was possible. The pilot controlled his machine by a regulation stick and rudder bar, with the then-popular wing-warping system used for lateral control instead of ailerons.

Now that at last a decision had been reached, there was hardly time enough to construct a good model. Still it was possible because of the simplicity of the plane itself, to devote proper attention to neatness and strength, and to add the details by "burning the midnight oil" before leaving for the Nationals. Well, any way we only had the brace wires and motor details to put on at Detroit the night before the contest.

With John L. Ogilvie, fellow representative of the Queens Aero Model Association, who had also eked out a Caudron, we took our model to the hangar where the preliminary judging was to take place. When the results were tabulated, John had forty-two and we had forty-four out of a possible fifty—just about the best scores made. The

(Continued on page 38)

A close-up that shows the realistic detail

Struck launches the plane on its winning flight at Detroit

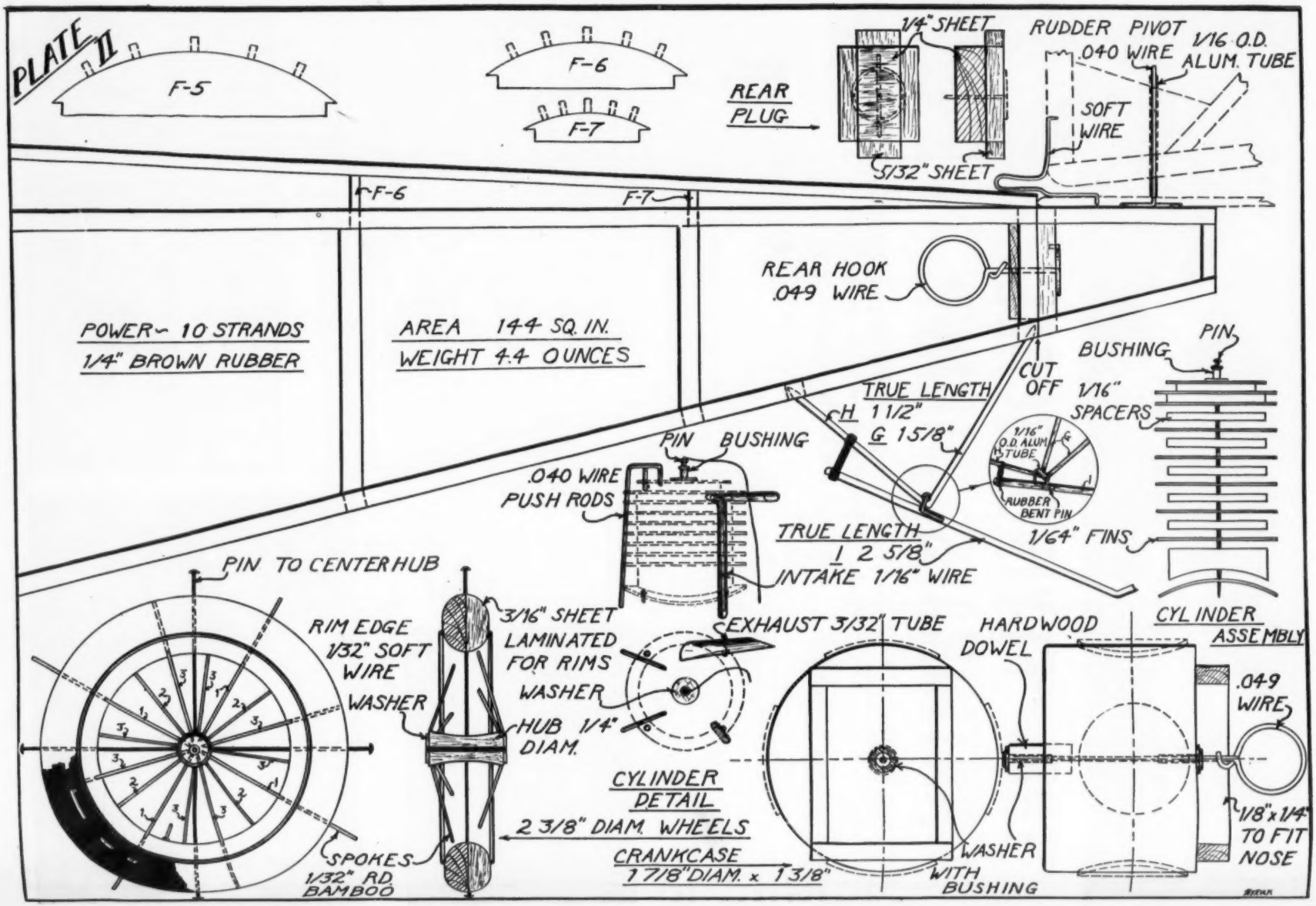


PLATE II
F-5
F-6
F-7
REAR PLUG
1/4" SHEET
5/32" SHEET
RUDDER PIVOT .040 WIRE
1/16 O.D. ALUM. TUBE
SOFT WIRE
F-6
F-7
REAR HOOK .049 WIRE
POWER - 10 STRANDS 1/4" BROWN RUBBER
AREA 144 SQ. IN.
WEIGHT 4.4 OUNCES
PIN
BUSHING
CUT OFF 1/16" SPACERS
TRUE LENGTH H 1 1/2" G 15/8"
1/16" O.D. ALUM. TUBE
RUBBER BENT PIN
PIN BUSHING
.040 WIRE PUSH RODS
TRUE LENGTH 1 2 5/8"
INTAKE 1/16" WIRE
1/64" FINS
PIN TO CENTER HUB
RIM EDGE 1/32" SOFT WIRE
WASHER
3/16" SHEET LAMINATED FOR RIMS
HUB 1/4" DIAM.
EXHAUST 3/32" TUBE
WASHER
HARDWOOD DOWEL
CYLINDER ASSEMBLY
.049 WIRE
1/8" x 1/4" TO FIT NOSE
CYLINDER DETAIL
2 3/8" DIAM. WHEELS
CRANKCASE 1 7/8" DIAM. x 1 3/8"
SPOKES 1/32" RD BAMBOO
WASHER WITH BUSHING

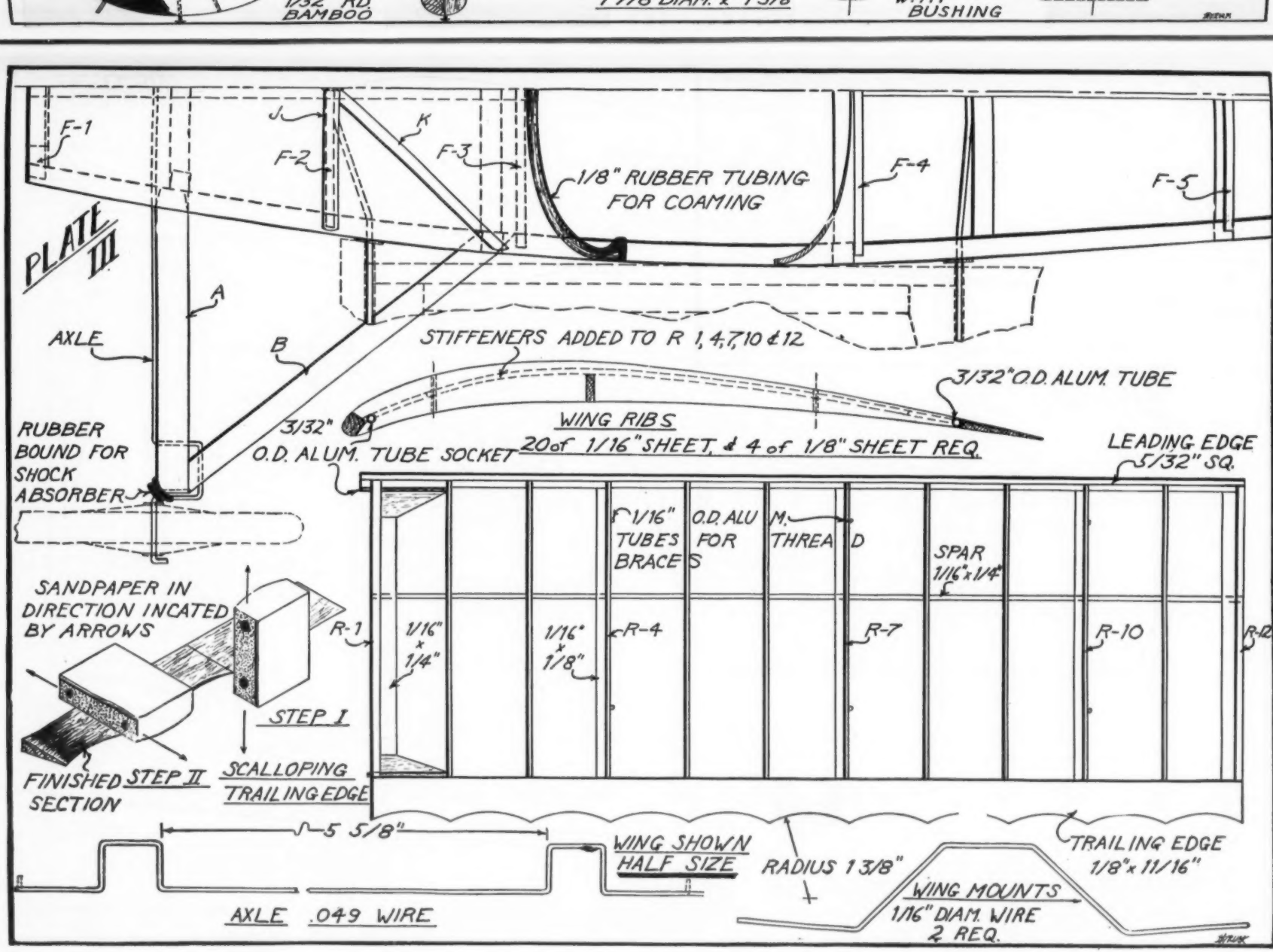
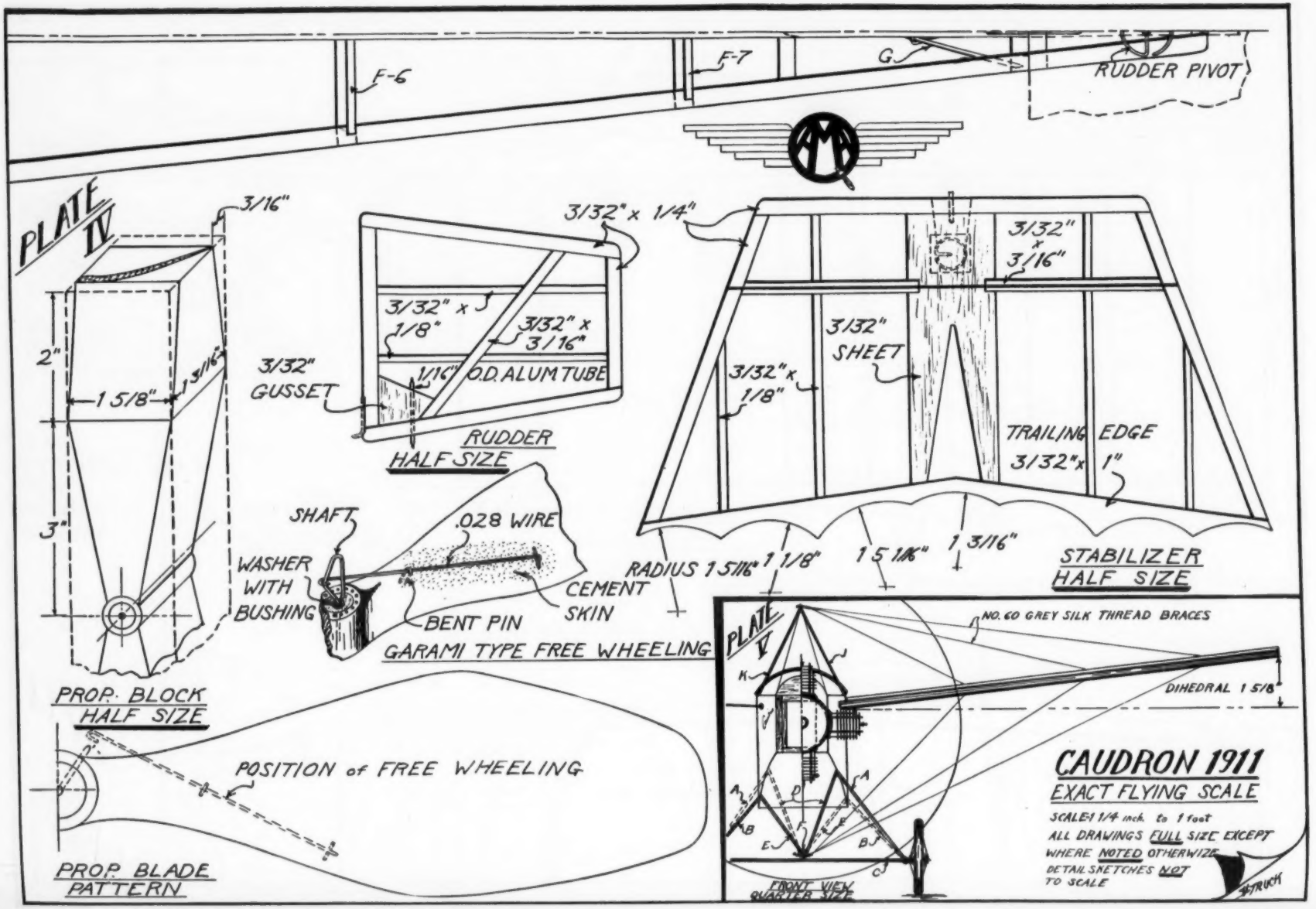


PLATE III
F-1
F-2
F-3
F-4
F-5
J
K
A
B
AXLE
1/8" RUBBER TUBING FOR COAMING
STIFFENERS ADDED TO R 1, 4, 7, 10 & 12
3/32" O.D. ALUM. TUBE
WING RIBS
20 of 1/16" SHEET, & 4 of 1/8" SHEET REQ.
3/32" O.D. ALUM. TUBE SOCKET
LEADING EDGE 5/32" SQ.
RUBBER BOUND FOR SHOCK ABSORBER
1/16" TUBES FOR BRACES
O.D. ALUM. THREAD
SPAR 1/16" x 1/4"
SANDPAPER IN DIRECTION INCATED BY ARROWS
R-1
R-4
R-7
R-10
R-12
1/16" x 1/4"
1/16" x 1/8"
STEP I
STEP II
FINISHED SECTION
SCALLOPING TRAILING EDGE
5 5/8"
WING SHOWN HALF SIZE
RADIUS 1 3/8"
TRAILING EDGE 1/8" x 11/16"
AXLE .049 WIRE
WING MOUNTS 1/16" DIAM. WIRE 2 REQ.


F-6
F-7
G
RUDDER PIVOT
PLATE IV
3/16"
2"
1 5/8"
1 3/16"
3"
PROP. BLOCK
HALF SIZE
3/32" x 1/4"
3/32" x 1/8"
3/32" x 3/16"
3/32" GUSSET
1/16" O.D. ALUM TUBE
RUDDER
HALF SIZE
3/32" x 3/16"
3/32" SHEET
3/32" x 1/8"
TRAILING EDGE
3/32" x 1"
RADIUS 1 5/16"
1 1/8"
1 5/16"
1 3/16"
STABILIZER
HALF SIZE
SHAFT
.028 WIRE
WASHER WITH BUSHING
BENT PIN
CEMENT SKIN
GARAMI TYPE FREE WHEELING
POSITION of FREE WHEELING
PROP. BLADE
PATTERN
PLATE V
NO. 60 GREY SILK THREAD BRACES
DIHEDRAL 1 5/8
FRONT VIEW
QUARTER SIZE
CAUDRON 1911
EXACT FLYING SCALE
SCALE: 1 1/4 inch to 1 foot
ALL DRAWINGS FULL SIZE EXCEPT
WHERE NOTED OTHERWIZE
DETAIL SNETCHES NOT
TO SCALE
STRUCK

THEY CALL IT DOWN THRUST

Why the Force Arrangement Called "Down Thrust" Is Misnamed and What It Is Actually From an Aerodynamic Standpoint

By GILBERT MacLEAN

IF YOU are a model builder you unquestionably have heard of "down thrust" and probably used it in the design of many models you have constructed. It is a safe bet also to assume that you never have tried to define it—you have just taken it for granted that you knew what it was and have used it. Perhaps this is the reason it continues to exist by this name.

At almost any contest you will be advised to use "down thrust" if your model does not perform properly. It appears to be a "cure-all" for all difficulties in much the same manner as the swabbing of the throat and two pink pills was the sole remedy for metabolistic disorders in the United States Army during the World War. But—, probably our readers are not familiar with this caricature of medical practice, as it occurred before the period of present-day model building.

If your model won't climb someone advises, "Use down thrust." If it stalls, "Use down thrust"—and, as a matter of fact, it very often cures most of the troubles that haunt your model.

Such a remarkable remedy for aeronautical diseases deserves a place of honor; and yet how can we define it? The nearest definition that can be established is as follows: Down thrust is the negative angle between the thrust line and an arbitrary base line which acts as a reference line in the building of the airplane. This appears to be quite simple but the measure of such a line depends entirely upon the position of the base line relative to other aerodynamic factors of the airplane. So we have model builders determining the degree of thrust relative to a line, the position of which is not definite.

It is possible some reader may object to this and say that he has drawn this line in a definite position and has calculated the other factors, such as the angle of incidence and tail angle, in relation to this thrust line. He fails to see however the position of such a line is purely arbitrary. In one model it may run from the top part of the nose of the fuselage to the lower rear corner. Again, it may start at the lower front part of the fuselage and run to the upper rear corner. In other words, this base line in any number of models may assume all different positions.

Sort of a will-o'-the-wisp aerodynamic factor.

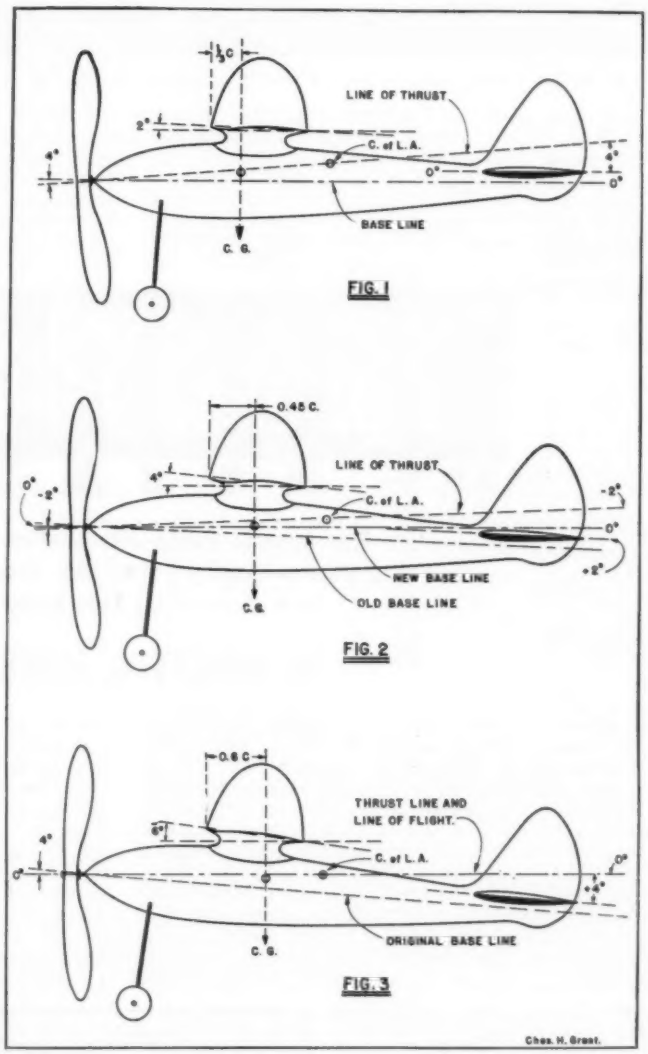
This is hardly the proper basis on which to build a mechanically accurate design for your model. It has been the result of the thinking of model builders who are prone to visualize their models as concrete structures of balsa wood, paper, wire, etc., instead of looking upon them as combinations of forces all interacting with one another simultaneously. This is the only way that a designer can visualize a model plane and understand what is taking place during its flight. The structure in itself has nothing whatever to do with the balances of an airplane in flight. This quality is the sole product of the action of the aerodynamic forces. Thus it is essential to thoroughly comprehend the significance of these in relation to their action upon the plane.

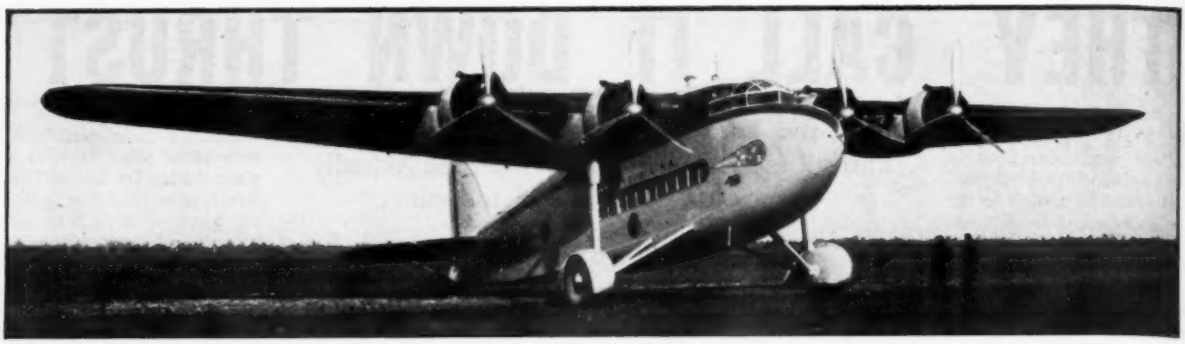
From this we can assume that "down thrust" should be determined and measured relative to the aerodynamic forces set up and not thought of as a function of, or something in relation to a structural element; such as the top longeron of the fuselage, for instance.

To illustrate our problem, suppose we take an example. A base line is drawn from the nose to the tail of the fuselage as shown in Figure I. The wing is set at a 2° angle of incidence to the base line. The stabilizer is set at zero or parallel to the base line. Now the model builder says, "In order to prevent the ship from having stalling characteristics, I shall give it 4° down thrust." So he draws in the thrust line 4° negative to the base line as shown in the figure. "Now," he says to himself, "I have followed all the rules of design"—and proceeds to determine the speed of his ship and the blade area, pitch, or other characteristics of the propeller on a basis of a 2° angle of incidence of the wing.

This young designer could not have made a greater mistake. To illustrate it, suppose the base line is changed to the position shown in Figure II; all the other features of the plane remaining in their same relative positions. The second base line is 2° more negative than the base line in Figure I. Now we have the same airplane with a wing angle of attack of 4° and a stabilizer set at 2° positive. The value of the negative thrust is — 2°. Now which set-up is right? Which should form the basis of calculation for speed in level flight position and the propeller characteristics? Here we have the same model insofar as its physical aspects are concerned with two different values of "down thrust." Obviously both models will perform alike as none of their char-

(Continued on page 42)





The Savoia Marchetti S-74, a typical Italian transport for 24 passengers and crew, with four 680 hp. engines. (Bulban)

FRONTIERS OF AVIATION

How the War Scare in Europe Has Affected Aircraft Production in the United States—Development of New Designs—How to Build a Scale Model of the Twin Engine Cessna

By ROBERT C. MORRISON

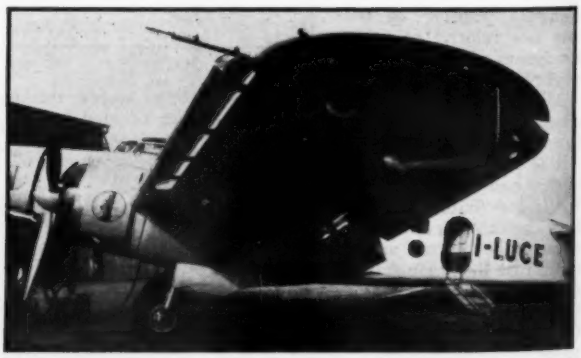
THERE is probably no other word than that little three letter one, "WAR," which is more startling and causes more excitement. It makes your eyes open and gives you that—! ! !—feeling. When this little word went bouncing around on the tongues of Europeans again a few months ago, after twenty years of more or less stagnation, it inadvertently released a new spell of life in American aviation. It was Hitler's own actions and ideas that caused many a foreign nation to send hurry-scurry orders to the United States for more aircraft. In frightening France and England with his antics Hitler unwittingly did more for American aircraft manufacturers than a whole corps of super-salesmen have been able to do for some time. He might be called the unofficial ambassador-at-large for the Aeronautical Chamber of Commerce; and for the first time it was brute force and not high-powered, polished ballyhoo that made the sales . . . . or was it so much ballyhoo?

Nevertheless it had results, and, as you undoubtedly know, England ordered 200 North American "Harvards" and 200 Lockheed "Hudsons" with spare parts for fifty more. France ordered 100 Curtiss "75s", and now that famous name, the "French 75," takes to the air. Since those orders Australia put in her call for fifty Lockheed "14" attack ships of the kind England ordered, and rather authentic word persists that the French have ordered approximately 100 Severskys, some Curtiss attack ships and thirty or more planes from West Coast manufacturers; not to mention a goodly supply of engines. It is also rumored that England is not through purchasing more American equipment, which may consist of new attack-bombers . . . . and others.

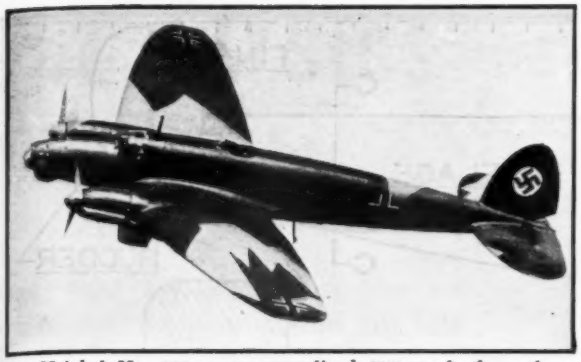
Mr. C. G. Grey, the noted English editor who has not as yet gotten over the fact that Hitler once sat in his office before he became famous, has lauded Germany's air progress and everything that goes with it. This is rather an odd slant for an Englishman to take of the situation, but in some respects Mr. Grey is correct. Adolf Hitler told his good friend, Herr Goering, to build up an air force second to none, and "between beers" the best air force in all Europe was formed. One of Goering's little helpers is Ernst Udet, an expert marksman, one of the world's greatest fliers and a former good friend of the United States. Udet, as we have already related in past issues, is not in favor of giant bombing planes, and that is why Germany is so totally lacking of them. In Udet's opinion the enemy is not at far distance, and for that reason small, fast, light bombers are more suitable to Germany's needs. More speed may be obtained from them, they are harder to hit because of their smallness, easier to build, not as much to lose if one is hit, and several may be built for the price of one large bomber. Also a batch of light bombers has a more scattered field of fire.

In your scribe's opinion they are the most vital weapon in an air force . . . . those attack bombers. Looking at the U.S. Army Air Corps we see a total of thirteen of them, the Curtiss YA-18's, to guard our 126 million population. They could not even create a noise against Germany's vast numbers of light Junkers bombers. But then it must be remembered that it was our air corps who originated the attack airplane, and though England will have 250 and Australia 50 of our own twin-

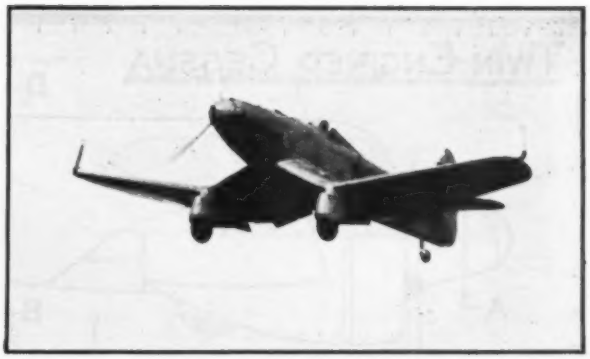
An instructor explains the principle and use of a leading edge "eyebrow" slot on a North American Trainer. (Acme)



They are going in for slots and flaps in Italy. Here is a Savoia Marchetti S-83 using these high lift devices. (Bulban)



The Heinkel He. 111, super-streamlined 300 m.p.h. four place bomber with two 910 hp. engines. (Bulban)



A new type of German single place inverted gull wing fighter with flaps, the Hamburg Ha. 137. (Bunban)

engined attack bombers while we still remain with thirteen, our airplane manufacturers are not taking the matter nonchalantly.

For the past year details of new attack-bombers have been kept rather secret, but as the month of March is drawing nearer (when the U.S. Army Air Corps opens bids on new attack-bombers), we are beginning to hear many murmurs of new ships. Possibly as many as eight manufacturers will compete. Word spreads that one ship in particular will do over 350 m.p.h. Others say that Curtiss has withdrawn their proposed job, probably to pick up more foreign trade in that line. Then we hear that the army called for special secret bids to be ready in forty days as the navy does, and thus the rumors keep spreading. They may all turn out to be true, but the fact is that the forthcoming attack-bomber competition will be one of the most highly contested ever to prevail in the air corps. The probable outcome will be that orders will have to be split between two or more companies. A variety of designs is promised with machine guns in every position imaginable, not to mention a belly-full of bombs.

As we have mentioned, one plane in the competition has already taken the air for its first test hop. It is Douglas' creation that was built at the former Northrop plant. Since Douglas' purchase of Northrop all planes emanating from the Northrop plant will be known as Douglas planes. Thus the famous name of Northrop is again gobbled up by another company. (Stearman took over the first Northrop Company.)

The attack-bomber stayed up for about half an hour on its first flight and appeared to perform very well. The air corps does not wish any details of design disclosed, so all we can say is that it is a high-mid-wing, twin-engined, all-metal, single-ruddered airplane with nose wheel. It is very small with plenty of power and all the machine guns one would want on an airplane.

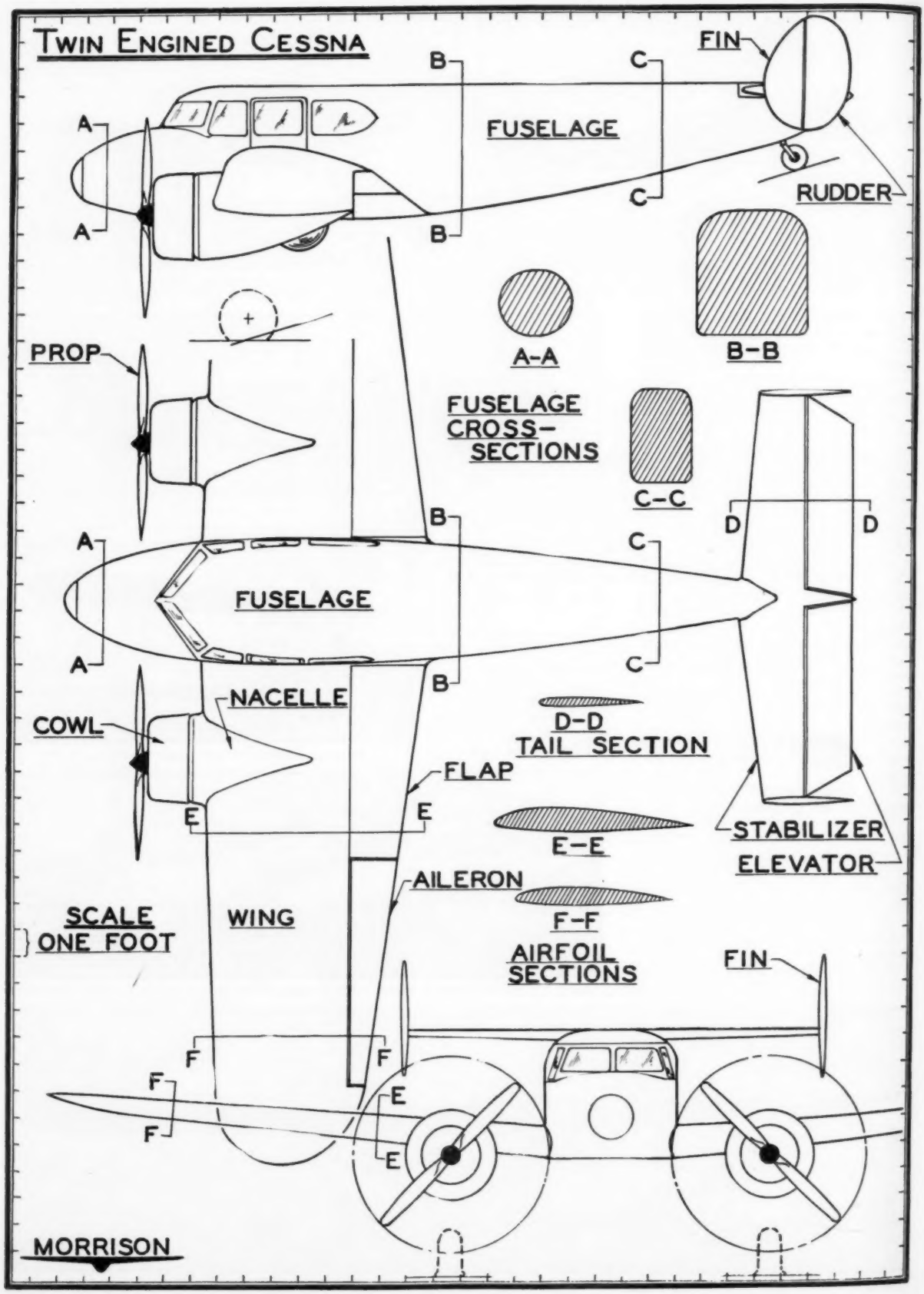
(Continued on page 55)

One of the German terrors of the sky; the Heinkel He. 112 single place fighter with super-streamlines; powered with two 650 hp. Junkers engines. (Bulban)

Grumman XF3F-1, recently accepted by the Army

The 235 m.p.h. Blackburn "Skua," 800 hp. naval dive bomber scout 2 seater. (Bulban)

The 215 m.p.h. Liore de Olivier "Leo" H-47 naval patrol bomber with four 1000 hp. engines and a crew of seven. (Bulban)


TWIN ENGINED CESSNA
FIN
B
C
A
FUSELAGE
RUDDER
A
B
C
A-A
B-B
PROP
FUSELAGE
CROSS-
SECTIONS
C-C
D
D
B
A
FUSELAGE
C
A
B
C
NACELLE
D-D
TAIL SECTION
COWL
FLAP
E
E
E-E
STABILIZER
ELEVATOR
AILERON
SCALE
ONE FOOT
WING
F-F
AIRFOIL
SECTIONS
FIN
F
F
F
F
E
E
MORRISON

THE PHYSICS OF THE AIRPLANE

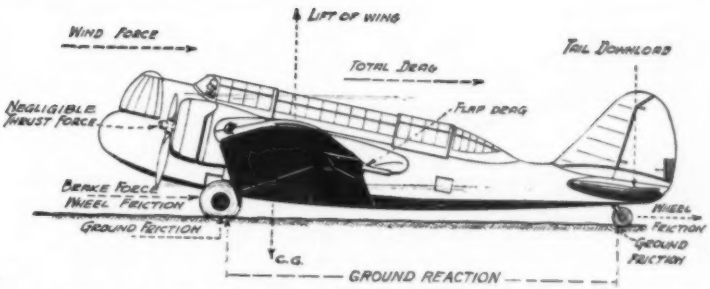


Figure 1. Forces tending to dissipate the kinetic energy of an airplane during a landing run

Work, Power and Energy—How They Are Related to One Another and the Part They Play in the Functioning of an Airplane

Article No. 7

By LT. JAMES EAMES and WILLIS L. NYE

IN THE everyday humdrum of flight operations at the airport we do not associate the take-off of a transport plane as a representative example of work. Nevertheless work is accomplished. For example, when a transport plane delivers a certain cargo from one airport to another, work is done. The actual work which is executed is equal to the weight of the loaded airplane, multiplied by the distance over which the cargo was transported. We define "work" as being the product of the force and the distance through which it moves the mechanism to which the force was applied. We speak of work in a true physical sense as being accomplished, when the point at which the effort is applied exhibits motion. The equation to illustrate this is:

Work = Force × Distance

When the application of force to a structure does not cause any apparent motion or displacement of the body, no work is accomplished in the true physical sense of the expression.

In the discussion of problems concerning the subject of work, which is equal to the force multiplied by the distance through which it acts, two quantities are used in the conventional equations. These two quantities represent force and distance. Since some common equivalent unit must be used to express the amount of work, the English System of units makes use of the term "foot-pounds." The foot-pound is defined as being equal to: The work which is done when a force which is equal to one pound acts through a distance of one foot. In stress analysis, the foot pound is broken down into inch pounds, since almost all airplane dimensions are given in inches. If the dimensions are given in feet, it is proper to use the term foot pounds. In the Metric System the gram-centimeter or the kilogram-centimeter is used to designate the amount of work.

As a practical example of the work which is accomplished when a transport airplane of ten tons weight climbs one thousand feet altitude above the runway, we may solve this as follows:

Work = Force × Distance

Work = 10 × 2000 × 1000 = 20,000,000 foot pounds.

The conventional gravitational units of work are a function of the gravitational force; and this in turn, is dependent upon the relative position upon the earth's surface. In scientific work of precise nature, an absolute unit is used. This unit is known as the Erg. The Erg is equal to:

An erg of work is equivalent to the work accomplished when a force of one dyne acts through a distance of one centimeter. The weight of a gram is equivalent to 980 dynes, and consequently, a dyne centimeter of work is equal to 980 ergs. If a mass of one gram is moved through a distance of one centimeter against the attraction of gravity, 980 ergs of work are said to have been done. A larger unit of work than the dyne-centimeter is embodied in the term of Joule. The Joule is equal to 10^7 ergs. Mention is made of these two units, which though highly scientific are used in precise aircraft experiments; the former in the wind tunnel measurements and the latter in research involving dynamometers, engine cooling and motor probles.

The rate of executing work is called Power. The common equation used to express this quantity is:

$$\text{Power} = \frac{\text{Work}}{\text{Time}} \text{ or } \frac{\text{Force} \times \text{Distance}}{\text{Work}}$$

In the preceding example, if the transport airplane attained 1000 feet of altitude in 60 seconds, then the power required from the engines was as follows: Power =

$$\frac{\text{Force} \times \text{Distance}}{\text{Time}} = \frac{20{,}000 \times 1{,}000}{60}$$

= 333,333 ft. lbs. per second

The term Horsepower is an English derivation and it is equal to 550 ft. lbs. per second or 33,000 ft. lbs. per minute or its equivalent. Internal combustion engines are rated in their power output in Horsepower. The abbreviation HP. denotes this. In engine research we find the term HP. used internationally. In the preceding example we can solve for the power required for the performance specified as equal to:

$$\text{Power Required} = \frac{333{,}333}{550} \text{ or } 606 \text{ HP.}$$

We consider airplanes as objects which possess two kinds of energy during normal flight. By virtue of their position above the earth, the airplanes possess potential energy or what may be classified as energy due to their relative positive. At the same time, aircraft being moving objects, possess kinetic energy. Consequently, the dissipation of the energy is a special problem if it is to be done safely. This process must be gone through every time an airplane lands and comes to a rest and the same process must be reversed in order to get the machine to fly in the air.

Now the problem of the dissipation of energy in any form is not as easily achieved as what first may be suspected. We know from the Law of the Conservation of Energy that energy cannot be created or destroyed. In other words, that the amount of energy contained in a body cannot be changed and therefore the only recourse is to transform this energy from one state to another state. In the event of the airplane landing, part of its kinetic energy and potential energy may be dissipated by the flap action, the skin friction, the runway surface, the drag and even the propeller sound as it glides to a safe landing. However, in rolling along the ground, the friction of the runway and the brakes complete the major retarding forces. In this attitude, the tires assume wear which is manifested in heat and friction, and the brake drums show a decided rise in temperature. This shows that the kinetic energy is being transferred into heat and so dissipated. For this reason the cooling of brake drums of large airplanes is a particular problem in the design of a chassis. Since large amounts of heat energy must be dissipated in a short time, coupled with the limitation of weight and size, this problem is one of difficult solution. Brakes will be used in the future with some provision made for water cooling.

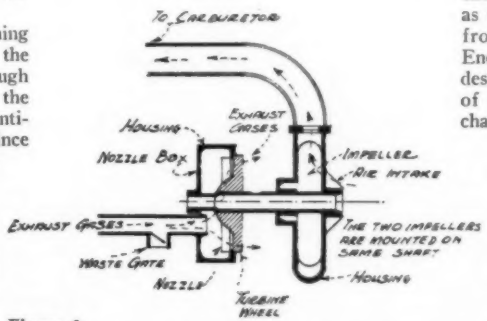
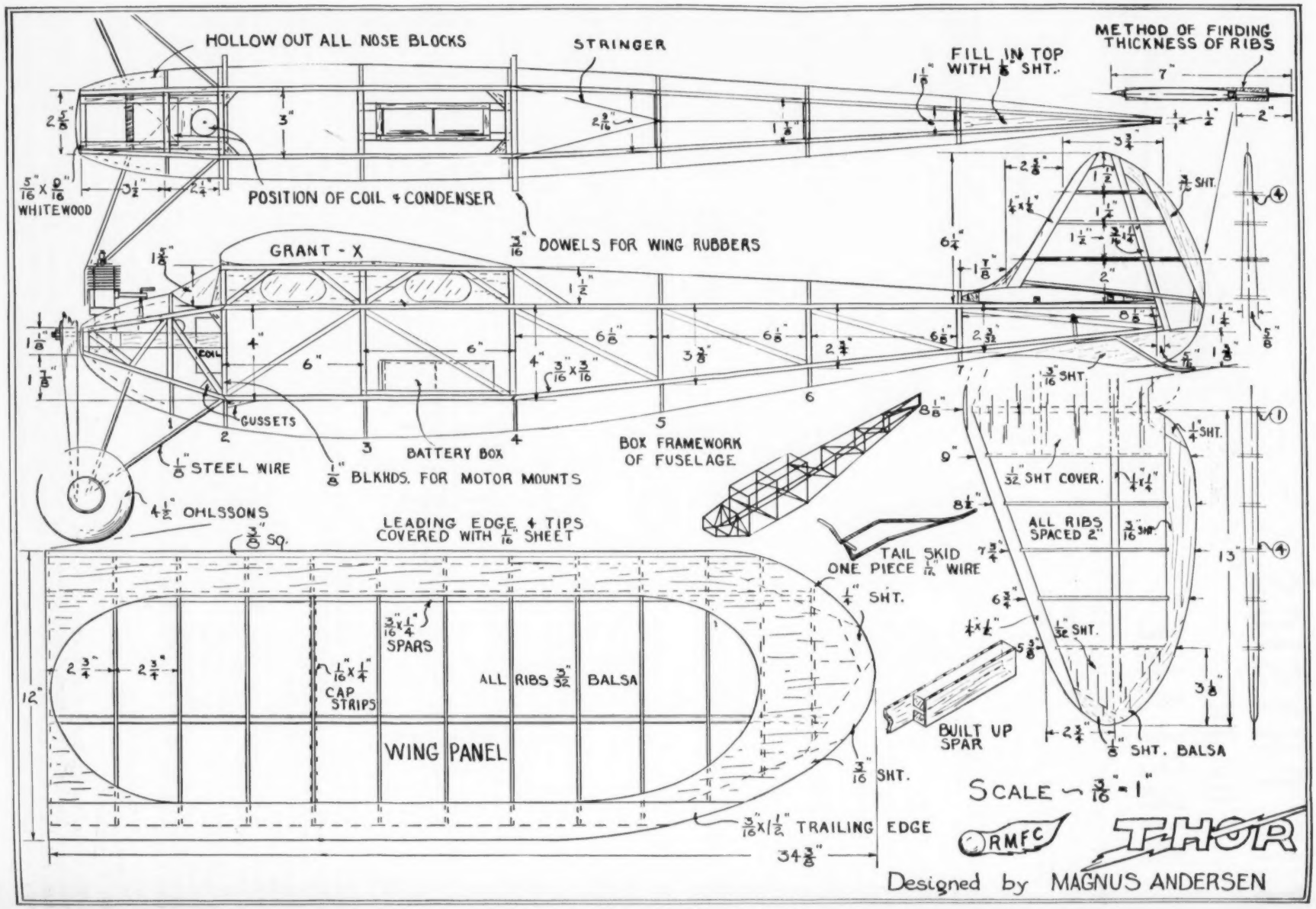


Figure 2. Working diagram of a turbo supercharger illustrating the principle of utilizing the kinetic energy present in exhaust gases

Another striking example where the dissipation of energy is concerned is the case of an airplane crash. As the airplane

(Continued on page 57)


HOLLOW OUT ALL NOSE BLOCKS
STRINGER
FILL IN TOP WITH 1/8" SHT.
METHOD OF FINDING THICKNESS OF RIBS
POSITION OF COIL & CONDENSER
3/16" DOWELS FOR WING RUBBERS
WHITEWOOD
GRANT - X
COIL
GUSSETS
1/8" STEEL WIRE
1/8" BLKHDS. FOR MOTOR MOUNTS
BATTERY BOX
BOX FRAMEWORK OF FUSELAGE
4 1/2" OHLSSONS
3/8" SQ.
LEADING EDGE & TIPS COVERED WITH 1/16" SHEET
3/16"x1/4" SPARS
1/16"x1/4" CAP STRIPS
ALL RIBS 3/32" BALSA
WING PANEL
3/16"x1/2" TRAILING EDGE
34 3/8"
12"
3/16" SHT.
1/32" SHT COVER.
ALL RIBS SPACED 2"
3/16" SHT.
1/4" SHT.
1/32" SHT.
1/8" SHT. BALSA
TAIL SKID ONE PIECE 1/16" WIRE
BUILT UP SPAR
SCALE — 3/16" = 1"
RMFC
THOR
Designed by MAGNUS ANDERSEN

BUILDING A SKY KING

How You Can Build a Consistent Contest Winner. A Gas Model With a Fast Climb and a Flat Glide

"Thor" embodies every quality for stability and efficiency

By MAGNUS ANDERSON

"THOR"—"Ruler of the skies"—is a model which lives up to its name. Since last November, 1937, it has won two trophies, five model motors, cash, an airplane ride, airplane wheels, and a book on model planes. Sounds like inventory—doesn't it?

This model has a steep, spiral climb and a glide as flat as the proverbial pancake. It soars on the slightest thermal. This is not due to lightness in weight as is usually the case, but to efficient aerodynamic design. The thick high-lift section absorbs excess power, which results in a steep climb and slows down the glide. The comparatively small cross-section of streamlined contour cuts down induced drag to a minimum. Correct distribution of lateral area has made it absolutely spiral-dive proof. This ship is also very rugged, having crashed into numerous obstacles including a car headlight, which resulted only in a broken prop. (Yes, it busted the bulb too.) Its highest official contest time is 12:15 with actual motor run of only 21 seconds. (Trenton Eastern States Contest). But "procrastination is the thief of time," so let's get on with the actual construction.

Construction of Fuselage

There is nothing extraordinary in the construction of the fuselage. It follows common practice; consisting of box framework, formers and stringers. The box framework of the fuselage is made of hard 3/16" square balsa strips. Apply two extra coats of cement at all the joints. the formers are made of medium 3/32" sheet balsa. Note that the notches for the stringers are cut only 3/16" deep. Notches are cut after formers are in place on the box framework.

Make the nose blocks out of medium balsa. Do not glue these permanently to the fuselage until the landing gear is in place, but merely cement them lightly for shaping. Care should be taken to shape the blocks so as to conform to the fuselage contours. The landing gear is glued and bound in place with heavy thread after the nose blocks have been shaped.

The motor mounts are made of 5/16" x 9/16" white wood. The nuts for the bolts that hold the motor are soldered to brass sheets which are in turn glued to the under-side of the motor mounts. Care should be taken to solder the nuts in line with the holes in the motor mounts. Mount the aluminum drip-pan as shown in the plans before the motor mounts are permanently installed. Do not omit the drip-pan, for without it the structure will soon be oil-soaked and greatly reducing its strength.

The coil and the condenser are securely held in place by a balsa panel to which they are fastened. This panel is between bulkheads No. 1 and No. 2, where the coil and condenser can be seen through the windshield for ignition checkup. The battery box is very simple, being of the ordinary box-type with brass sheets for terminals. One end is hinged and rubber bands are wrapped around the box to insure tight contact.

Timers with long arms are preferable as they can be installed inside the fuselage out of the slipstream to reduce drag.

Dovels through the fuselage are used to hold the wing rubber bands.

Magnus Anderson, creator of "Thor," with two of the trophies his plane has won

Wing Construction

A board or table whose surface is perfectly straight should be used in the construction of the wing to avoid warpage. The wing uses the Grant X airfoil which has been found to give excellent results. All ribs should be cut out of medium soft balsa. Care should be taken in notching ribs for the trailing edge to preserve the accuracy of the airfoil.

In assembling the wing, the ribs are lined up on the hollow main spar. Other sparts are installed, followed by the leading and trailing edges. Cap strips are added before the trailing edge is shaped. Wing tips are covered on top only with 1/16" sheet. Cut away the main spar only from bottom for tip ribs, as negative angle is thereby created in the wing tips increasing the stalling angle of the wing. The center section should be constructed now. The center section braces are added and the wing panels are joined as shown in the plans. The center section is then covered top and bottom with 1/16" sheet.

Tail Surfaces

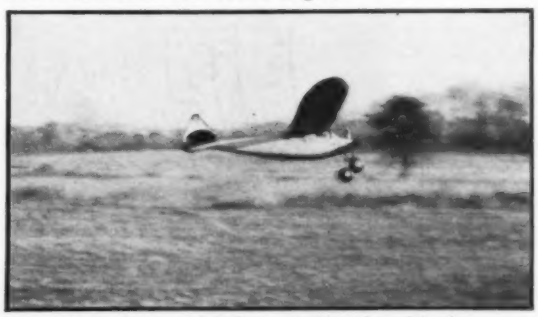
Most builders hurry the construction of the tail surfaces but as much care should be taken with them as with the rest of the model. The method of making the ribs is clearly shown in the plans. The stabilizer is made in one piece and is covered top and bottom at the center section. Little more need be said as they are clearly shown in the plans. However, be absolutely sure they are firmly cemented to the fuselage.

Flying and General Hints

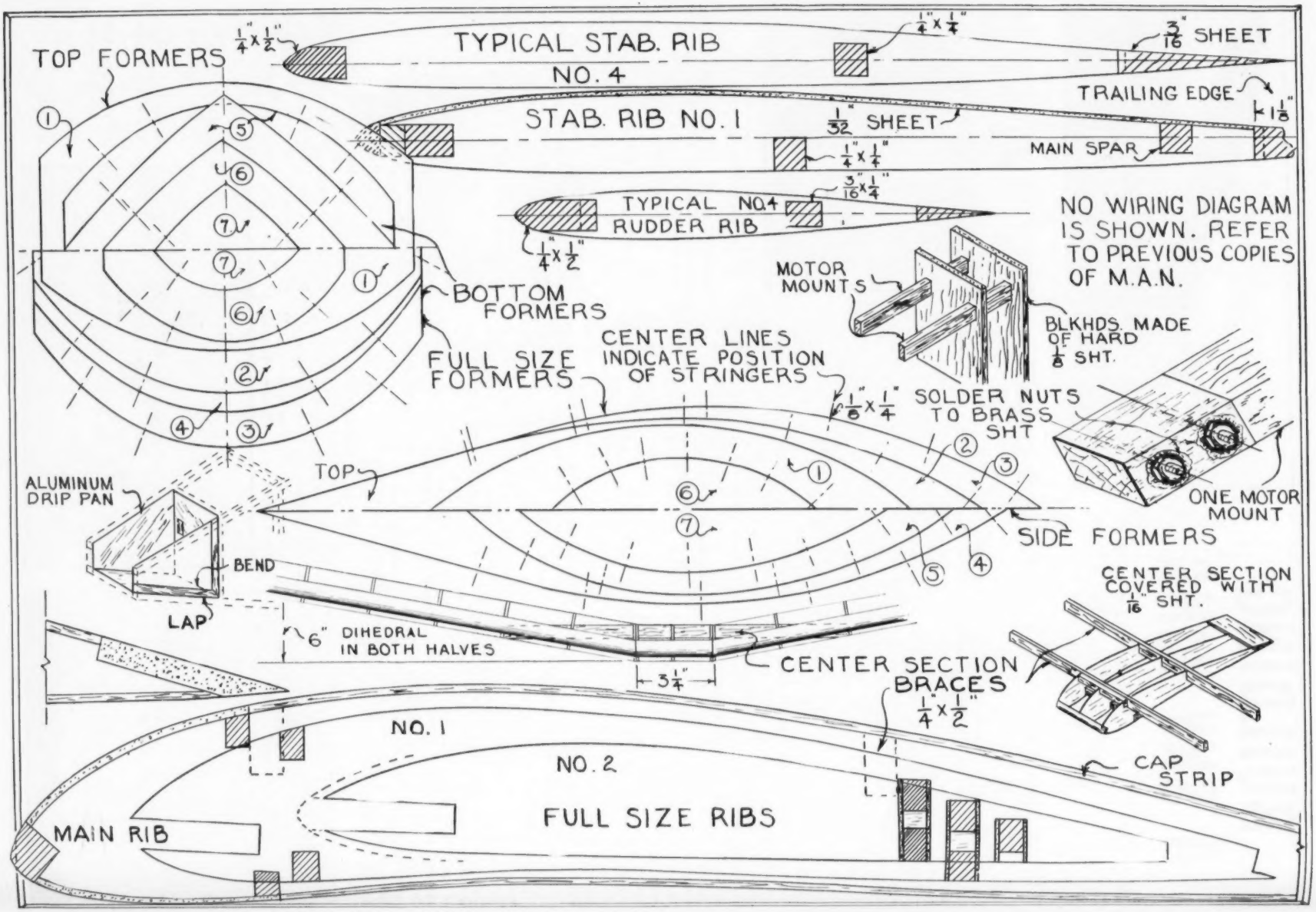
Before taking the model out for flying the following points

(Continued on page 40)

Climbing after the take-off



Gathering speed before climbing for altitude


TOP FORMERS
1/4"x1/2"
TYPICAL STAB. RIB NO. 4
1/4"x1/4"
3/16" SHEET
TRAILING EDGE
1 1/8"
STAB. RIB NO. 1
1/32" SHEET
1/4"x1/4"
MAIN SPAR
3/16"x1/4"
TYPICAL NO.4 RUDDER RIB
1/4"x1/2"
NO WIRING DIAGRAM IS SHOWN. REFER TO PREVIOUS COPIES OF M.A.N.
MOTOR MOUNTS
BLKHDS. MADE OF HARD 1/8" SHT.
BOTTOM FORMERS
FULL SIZE FORMERS
CENTER LINES INDICATE POSITION OF STRINGERS
1/8"x1/4"
SOLDER NUTS TO BRASS SHT
ONE MOTOR MOUNT
TOP
ALUMINUM DRIP PAN
BEND
LAP
SIDE FORMERS
CENTER SECTION COVERED WITH 1/16" SHT.
6" DIHEDRAL IN BOTH HALVES
3 1/4"
CENTER SECTION BRACES 1/4"x1/2"
NO. 1
NO. 2
CAP STRIP
MAIN RIB
FULL SIZE RIBS

National Aeronautic Association Junior Membership News

Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.

A form containing details about the new gas model insurance and an official application will be sent upon request. Send a card to the National Aeronautic Association, Dupont Circle, Washington, D.C., stating whether or not you are a member of the N.A.A. Gas Model Division, and you shall receive your copy immediately.

Announcing New Membership Divisions

AFTER January 1, 1939, a new membership grouping will become active in the Model Division of the N.A.A. Relative to this change, it will be noted that the Junior, or 50c membership, will be eliminated. The new model membership divisions are as follows:

1. *Affiliated Clubs*—a form of membership reserved for extremely large groups whereby a low membership fee and a program of activity having widespread appeal is maintained, to the end that basic aviation education and training will be encouraged among the widest possible group.

2. *N.A.A. Model Chapters*—wherein rubber (members up to 21) open class (rubber flyers 21 and over), and gas (members 16 and over) model members may group together in number of 20 or more to form a chapter. *Annual fees for rubber, open class, and gas model membership are $1.00 per year.*

3. *Individual N.A.A. membership*—in cases where there is an insufficient number of modelers to form an N.A.A. Model Chapter, individual members may join upon payment of an annual fee of $1.00 for rubber, open class, or gas model membership.

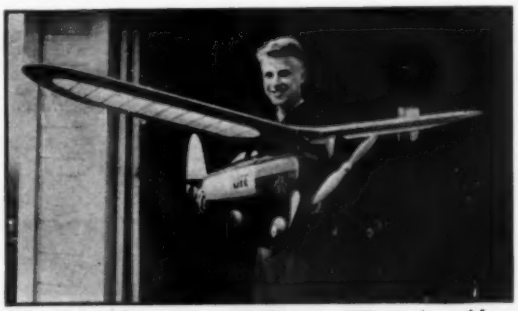
In Nos. 2 and 3, gas model membership will entitle the holder to all the privileges of rubber or open class membership; this, however, only if the applicant is 16 years of age or over, i.e., the holder of a gas model license need not apply for a rubber or open class license in order to compete in rubber events.

In general, N.A.A. model chapters in the territory served by an affiliated organization under this agreement, can operate primarily as expert and honor clubs either in cooperation with or within the general framework of the affiliate organization activity. Membership in such a chapter should be viewed as an honorary accomplishment by members of affiliate organizations. It is believed that under this policy chapters of "experts" can serve logically as helpful planning boards for contests and similar technical activity of an affiliate organization, with individual members serving helpfully as assisting officials and instructors in the mass educational activity of an affiliate organization.

Model experts who hold this graded individual membership in the N.A.A. and have outstanding records of accomplishment may receive special recognition by election to the N.A.A. Academy of Model Aeronautics, which is charged by the N.A.A. with the drafting of official rules pertaining to model records and meets, and with the encouragement of scientific development.

This revised N.A.A. Model Membership set-up will be discussed further in the next issue of MODEL AIRPLANE NEWS.

Some of the members attending the Academy of Model Aeronautics Meet at the Hotel New Yorker on Nov. 26 and 27. 1st row: Phil Zecchitella, Carl Goldberg, Ed Roberts, Irwin Polk, Al Lewis, Walt Grubbs. 2nd row: Victor Fritz, Mr. Papoon, Joseph Kovel, Roger Hammer, Louis Garami, Wm. Effinger, Leon Schulman. 3rd row: Henry Struck, Wm. Berry, Nat Polk, Avrum Zier.



John Sniegoski, gasoleer of Wausau, Wisconsin, with a very pretty job he put together. Nice work, John.

Chapter News

On November 14 a new and complete list of model records was sent each contest director and chapter representative of the N.A.A. Our new schedule for listings calls for a new issue four times a year: January 1, April 1, July 1 and October 1. In between and supplementary to these new listings, a complete report of new records for each month will appear in the "Eagle" . . . if you would like one of these lists, write to the National Aeronautic Association, Dupont Circle, Washington, D.C.

Prominent pilots of Rockford, Illinois, have joined in helping to launch an aviation ground school for Rockford boys. Dr. F. H. Spickerman, N.A.A. contest director and chairman of the Rockford Chamber of Commerce aviation committee, has appointed Fred Machesney, manager of the local port, and Harold Sandberg, also of the airport staff, as instructors. Speaker at the last meeting was Fred Richards, Rockford pilot with Pan-American Airways, who has flown over 288,000 miles over the Pacific in the last year and a half. Before joining the Pacific service, Mr. Richards made the Miami-South America run for Pan American, flying more than a million miles

(Continued on page 28)

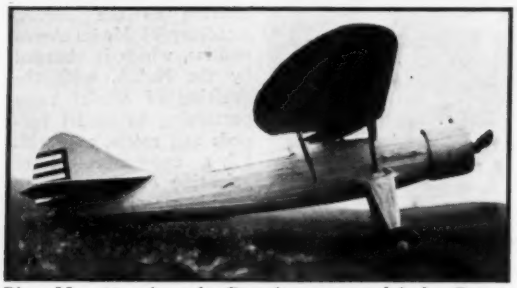
JOIN THE NATIONAL AERONAUTIC ASSOCIATION!
SEND FOR APPLICATION BLANK TO N.A.A., DUPONT CIRCLE, WASHINGTON, D.C.

GAS LINES

Official Section of the National Aeronautic Association Gas Model Division

The I.G.M.A.A. Trophy to Be Awarded for Greatest Duration With a Twenty Second Motor Run

Pict. No. 1. Getting 'er away for a winning flight



Pict. No. 10. A scale Douglas gas model, by Byron Jenkins

ON NOVEMBER 26th and 27th the Academy of Model Aeronautics held its annual meeting at the Hotel New Yorker, New York City. Delegates from various parts of the country assembled in order to discuss Academy organization problems and to establish new rules for the coming year. These were taken up at length and several changes made, which the delegates felt would be of material help at coming contests. The complete list of new rules, with the changes, will be published in the coming issue.

We suggest that, in regard to gas model rules, all gas model builders write to us and send in the changes they feel should be made in the present rules. This should be done immediately, before the N.A.A. Contest Board passes and makes public the rules suggested by the Academy.

The objective of the Academy in making rules for gas models as well as rubber models is to create those which will be the true expression of the desires of model builders as a whole. Unless Academy members are thoroughly acquainted with the wishes of model builders throughout the country, they cannot faithfully execute their responsibility.

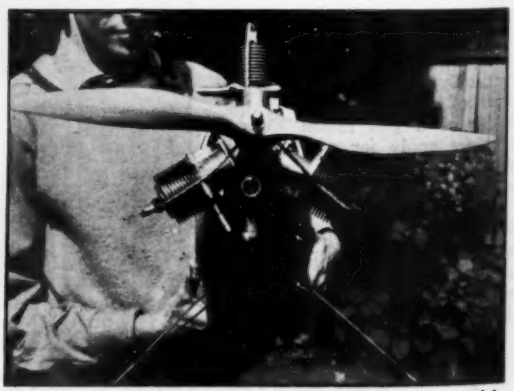
Let us know therefore as soon as possible what your objections are to the present ones and what you wish for the future.

We wish to remind you that the I.G.M.A.A. Trophy is still in existence and any member of the Gas Model Division of the N.A.A. may compete for this trophy. In the past the trophy has been given to the model builder who makes the longest duration flight using 1/16 ounce of gas per pound of weight of the airplane. Inasmuch as this event has been discontinued by the N.A.A. we wish to announce that the trophy, after April 1st, may be competed for on a basis of a twenty second engine run.

Pict. No. 9. John Clemens and his ship

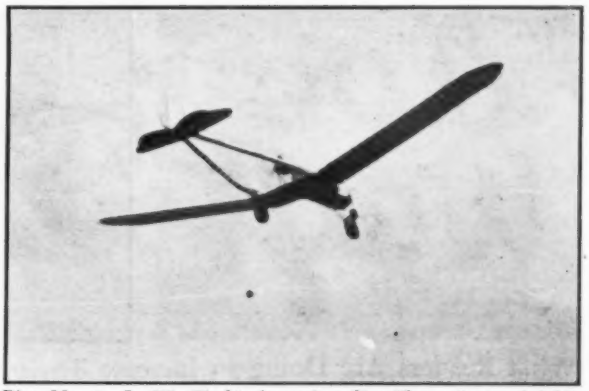
No. 8. This Robin didn't do so well

Pict. No. 4. Col. Batista, Cuban Dictator, shows interest in his son's gas job



Pict. No. 5. Seeing is believing; a 3 cylinder gas model

Pict. No. 2. This shows what they are building in Russia



Pict. No. 3. L. W. Clark's low-wing flies like a "parasol job"

In other words, the model flier who makes the longest flight with an engine run of twenty seconds will win the trophy. The trophy is held at present by Mr. Roland Fischer of 4510 Elm Court, Denver, Colorado. We suggest that Fischer get busy and establish a record under this new category, so that he may retain the trophy and give other model builders something "to shoot at."

Picture No. 1, at the head of our columns this month, typifies the action that takes place at every contest. Here you see Dan Bunch of 5009 South Hoover Street, Los Angeles, Calif., getting his ship under way on a flight that won the San Joaquin Valley Championship. This little ship climbs almost vertically.

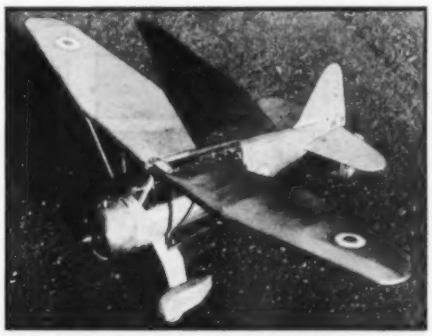
Very little news concerning model activities comes out of Russia, and no doubt model builders wonder what this far-off country is doing with this great means of instruction in aviation. Picture No. 2 will give you an idea of some of the work the Russian model builders are doing. Lyonia Vorobiev, one of the participants at the Moscow regional contest, is shown with his low-wing ship. We see it is distinctively Russian in design; making use of low wings. Young Russians used to use American made motors; however, now they are producing their own, one of which powers this plane.

Speaking of low-wings, picture No. 3 shows another ship of this type in full flight. It was built by L. W. Clark of Lusk, Wyoming. This is the first ship Clark has designed, after having built one from a kit. It is more or less like the Hammond Pusher, with the motor in the rear. The model is powered with a Syncro Ace. At this altitude, 5,000 feet, Clark says it does not climb exceedingly fast but is very stable in flight. This is a great accomplishment inasmuch as low-wings usually lack the stability qualities possessed by high wing or parosal planes. Clark was the first young man to build a gas model in his community; but now several other fans are following his lead.

He suggests that MODEL AIRPLANE NEWS display a picture of a very well-designed model on the cover rather than one of a large ship. What do other readers think about this idea? We will be glad to hear from them concerning it.

Pict. No. 11. A beautiful amphibian, built by Peter Bowers, that deserves a big hand. It operates successfully from both land and water

Pict. No. 12. Not a ghost ship, just night flight

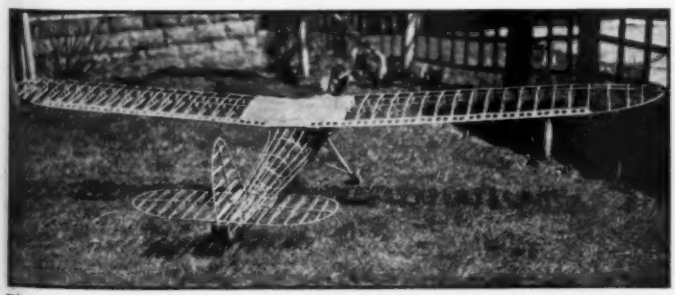


Pict. No. 13. A 54 inch scale model Westland Lysander by "Skeeter" Palmer, weighing 2 lbs.

It appears that gas models have migrated to Cuba; for picture No. 4 shows Papo Batista, son of Colonel Batista, Cuban dictator, with a new gas job he received recently from his air-minded father. This picture is typical in respect to the interest gas models create not only among the younger generation, but among older people.

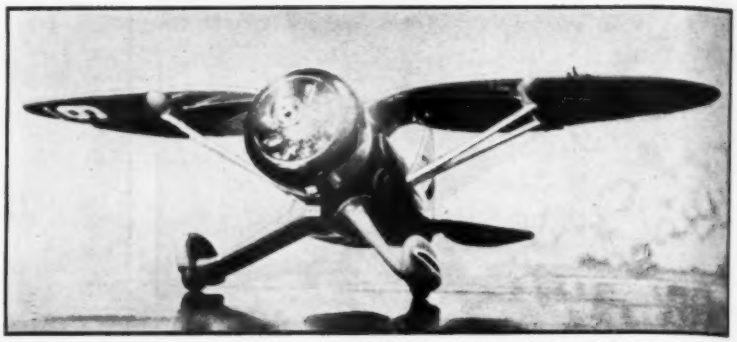
Whereas rubber powered models appeared to be "child's play" to adults, apparently now that models have graduated

(Continued on page 49)



Pict. No. 6. A gas model with a framework made entirely of metal; built by Mr. Thomas J. Clyburn, who helped build the Akron

Pict. No. 7. J. K. Northrop, builder of planes, examines Marpel streamline wheels on a Warrior model



Pict. No. 1. A prize winning Hall-Springfield Racer by S. A. Lambert, Jr.

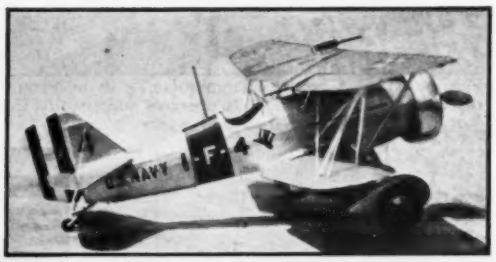
What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World

DURING the winter months, when the weather does not encourage flying models out of doors, model builders apply their art to solid scale models more than at any other time during the year.

Mr. S. A. Lambert Jr. of 2052 E. 96 Street, Cleveland, Ohio, is one of these who takes delight in scale model work. He sends us picture No. 1, showing his Hall-Springfield Racer, which took third prize at the Scripps-Howard National Contest. This little plane required 500 hours to complete and its construction includes every detail except controls from the cockpit. It was built from plans which appeared in the June 1933 issue of MODEL AIRPLANE NEWS. Though a type produced several years ago, this plane has characteristics which compare favorably in every way to modern ships. You will note the highly streamlined fuselage and the gull wings. A ship of this design should prove to be an excellent fast climbing, high altitude fighter. Usually parasol or gull wing ships are excellent for climbing, while low wings give unusual speed. Lambert has done a very fine job on this model and the completely detailed engine is worthy of particular attention.

Pict. No. 2. George Gifford built this beautiful Goshawk

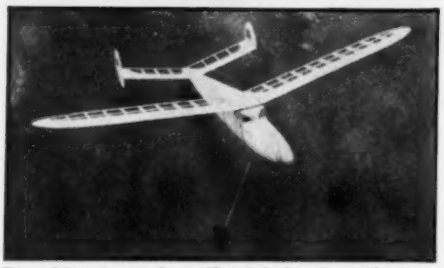
Pict. No. 3. Eugene Linn with his winning Wakefield model



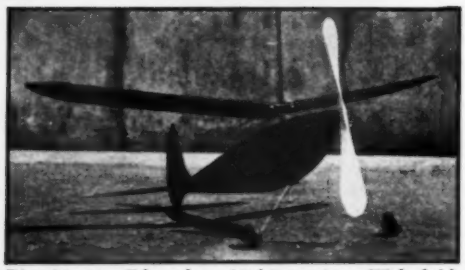
Picture No. 2 shows a very beautiful scale Curtiss Goshawk of twenty-four inch span. This also is complete in all details; which include bombs, antenna and full equipment in the cockpit. It was built by George Gifford of 62 Colony Street, Bridgeport, Conn. We are indebted to Donald Youngson of 29 Lenox Avenue, Devon, Conn. for this information.

Eugene Linn of 1616 Jackson, Wichita, Kansas, writes us and says he has over eighty issues of MODEL AIRPLANE NEWS, the earliest of which is August 1929. This young man certainly deserves a place of honor on the roll of MODEL AIRPLANE NEWS readers. Incidently, in the issues he has collected he has

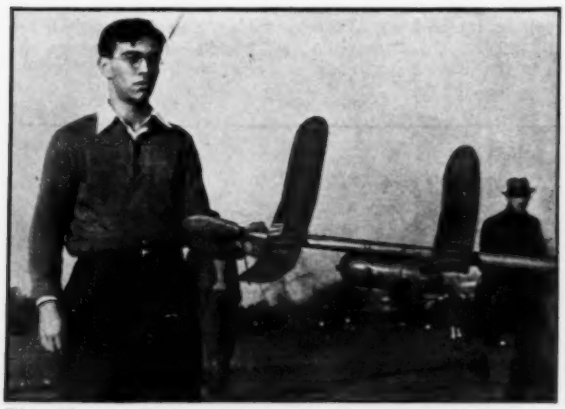
(Continued on page 59)



Pict. No. 4. A beautiful job by Donald Coles



Pict. No. 5. Edward vonHafe's 11.6 oz. Wakefield



Pict. No. 7. George Brown with his "would-be" fuselage model

Pict. No. 6. Winners of the M.M.L.C. contest at Central Park, N. Y. City

Article No. 82
Chapter No. 5

The Procedure of Gas Job Propeller Design

A Complete Step by Step Explanation of How to Design Propellers For Your Gas Model

By CHARLES HAMPSON GRANT

PRIOR to the discussion of gas model propeller design which was taken up in the last six articles of this series, the required procedure for designing gas models of maximum performance was outlined.

From examination of the performance chart (page 13, May 1938 issue) it was found that the models that would give the maximum performance when powered with a 1/5 horsepower engine, ranged in weight from 2.8 pounds to 3.6 pounds, and in area from 4.5 square feet to 7.2 square feet. This was based on the assumption that the planes would be constructed to a practical minimum of lightness. This limit is represented by the minimum practical wing loading line on the chart. Of course some builders are clever enough to build planes lighter than indicated by this line without structural weakness, but they are the exception. The plane that will give the highest rate of climb as indicated by the chart should have a wing area of 5.85 square feet and will weigh about 3.2 pounds when constructed to the average limit of lightness. Such a plane will have a wing loading of 8.75 ounces per square foot. This of course is above the minimum allowable wing loading of eight ounces per square foot. Though this plane will have a high rate of climb, it will glide and sink faster than one with an eight ounce wing loading. It is represented by point (Y) on the chart.

A plane with a wing area of 7.2 square feet weighing 3.7 pounds is represented by point (X) on the chart. This plane will weigh only eight ounces per square foot and will have a rate of climb about as high as the plane represented by point (Y). It has the added advantage of lighter wing loading and a consequent slower glide and lower sinking velocity. This plane, which we have designated as plane No. 1 in previous articles, should prove to be the best possible plane from a standpoint of performance and reasonable strength. The smaller plane has been referred to previously as plane No. 2.

It is apparent from looking at the chart that if a builder can construct plane No. 2 so that it has a weight of only eight ounces per square foot instead of nine ounces, then this plane would give a performance superior to plane No. 1. Then, plane No. 2 would have a total weight of only 2.9 pounds. Plane No. 1 cannot be built to weigh less than eight ounces per square foot and yet conform to the present NAA contest rules.

The general design characteristics of these two planes have been established in previous pages of this series of articles as examples of the procedure of design. The only design factor which has not been determined for these planes is the propeller.

Therefore these two practical cases will be taken as a means to illustrate the exact procedure of designing an efficient propeller for a gas model. Up to this point the characteristics of the planes have been established as follows:

Plane No. 1: Total weight=3.58 lbs.; Span=90 in.; Wing chord at root=15 in.; Chord at wing tip=9 in.; Wing area =7.16 sq. ft.; Tail moment arm=36 in.; Nose length=12 in.; Stabilizer area=311 sq. in.; Fin area=83. The plane is to be powered with a 1/5 hp. motor which has a normal running speed of 4000 r.p.m. The Grant X wing section will be used. (This section will be used instead of the Grant X-8, as stated previously.)

Plane No. 2: Weight=3.2 pounds; Wing span=75 in.; Wing chord at root= 11 7/8 in.; Wing chord at tips=7 1/8 in.; Wing area=5.9 sq. ft.; Tail moment arm =30 in.; Nose length=10 in.; Stabilizer area=203 sq. in.; Fin area=54.16 sq. in. A Grant X wing section is to be used and the plane is to be powered with a 1/5 hp. motor turning at 4000 r.p.m.

When the procedure of designing a propeller for a gas model is thoroughly understood, the problem becomes quite simple. In past pages this procedure has been discussed at length; however an outline of the steps and the order in which they are to be taken is summarized here so that the procedure will be clear to you.

Steps in the Procedure of Propeller Design

Determine:—

1. The normal running speed of the engine to be used.
2. The minimum flying speed of the plane in level flight.
3. The required pitch speed of the propeller.
4. The required pitch of the propeller.
5. The desired diameter-blade width ratio of the propeller.
6. The required diameter of the propeller.
7. The maximum width of the propeller blades.

Now we are ready to design the propellers for planes No. 1 and No. 2, step by step. First, we know that the normal engine speed will be 4000 r.p.m. Second, the minimum flying speed of the plane in normal flight may be determined from the graph on page 17 of the November 1938 issue, or by direct calculation.

It has been decided that the models will be of the parasol type, as this will provide the greatest stability. The angle of incidence should be three degrees. The plane's speed therefore may be determined from the graph without interpolation. (For plane speed at other angles of incidence see page 44, Nov. 1938 issue.)

In order to determine the speed by means of the chart the *camber factor* of the wing section, as well as the wing loading of the plane, must be known. The Grant X section is to be used on both plane No. 1 and No. 2. The camber factor for this section is given as (0.0885) in the table above the graph (page 17, Nov. 1938 issue.) The wing loading of plane No. 1=8 oz. per sq. ft. Plane No. 2 will have a wing loading of 8.75 oz. per sq. ft.

Now to find the speed of plane No. 1, find the point represented by (0.0885) in the column of camber factor values at the left of the graph. Follow horizontally to the right from this point across the face of the graph until the imaginary horizontal line through the point intersects the vertical line through the point representing 8 oz. per sq. ft. in the wing loading column at the lower edge of the graph. This point lies between the diagonal lines representing 17 and 18 miles per hour. It is about three-fourths the distance between the two lines, from line 17. Therefore the speed of plane No. 1 will be 17.75 miles per hour.

By the same procedure the speed of plane No. 2 is found to be 18.5 miles per hour.

The speed of each of these planes may be calculated by the following formula (page 50, Oct. 1938 issue) if you do not care to use the graph method:

$$V=\sqrt{\frac{W(3+I)}{1.728(F_R)A}}$$

V=the plane speed; W=the plane weight in ounces; I=the angle of incidence of the wing,=3 degrees; F_R=the camber factor; A=the wing area in sq. ft.

The third step is to find the required pitch speed of the propeller, provided that the propeller values are to be determined by calculation and not by means of tables or graphs. If the designer prefers to use the former method, he may use the following formula:

$$P=\frac{3V}{2}.$$

In which (P_V) represents the *pitch speed* and (v) the speed in miles per hour of the plane, (level flight speed at desired angle of incidence).

This speed value in the case of the two planes are: Plane No. 1=17.75 m,p,h,; plane No. 2=18.5 m.p.h. Therefore, by means of the formula, we find that the pitch speed (P_V) of plane No. 1 should be (26.64) m.p.h. and of plane No. 2 (27.75) m.p.h.

The fourth step is to determine the pitch that the propeller should have. Its value is given by a simple formula when the normal engine speed is 4000 r.p.m. (The average 1/5 hp. motor should turn at this speed to obtain greatest thrust efficiency.) The formula is: P=(O.4)V. Then for *plane No. 1, the propeller pitch should be 7.1 inches and for plane No. 2, 7.4 inches.* The pitch may be determined from the graph

(Continued on page 34)

OFFICIAL NATIONAL MODEL AIRCRAFT RECORDS
AS OF OCTOBER 1, 1938

INDOORS

STICK MODEL AIRPLANES, Hand-Launched

Class B

Junior:	John S. Stokes, Jr., Huntingdon Valley, Pa.	18m 12.2s
Senior:	Wallace Simmers, Chicago, Ill.	21m 30s
Open:	Ernest A. Walen, Springfield, Mass.	18m 46.5s

Class C

Junior:	John S. Stokes, Jr., Huntingdon Valley, Pa.	20m 53s
Senior:	Robert Jacobson, Philadelphia, Pa.	25m 29s
Open:	Carl Goldberg, Chicago, Ill.	23m 29.3s

STICK MODEL AIRPLANES, R. O. G.

Class A

Junior:	Ralph Brown, Arlington, Mass.	12m 27s
Senior:	Ervin Leshner, Philadelphia, Pa.	15m 47.4s
Open:	Joseph P. Matulis, Chicago, Ill.	11m 33.8s

Class B

Junior:	John Stokes, Jr., Huntingdon Valley, Pa.	17m 19.3s
Senior:	Milton Huguelet, Chicago, Ill.	17m 36.4s
Open:	Ernest A. Walen, Springfield, Mass.	17m 42.8s

STICK MODEL AIRPLANES, R. O. W.

Class A

Junior:	W. N. Hewson, Atlantic City, N. J.	7m 25s
Senior:	George Micott, Allentown, Pa.	8m 05.4s
Open:	Bruno Marchi, Medford, Mass.	8m 42.2s

Class B

Junior:	David Call, Philadelphia, Pa.	10m 41.2s
Senior:	Walter Lees, Philadelphia, Pa.	14m 35.4s
Open:	William Latour, Philadelphia, Pa.	13m 15s

GLIDERS, Hand-Launched

Class A

Junior:	Milton Huguelet, Chicago, Ill.	44.5s
*Senior:	Wallace Simmers, Chicago, Ill.	53.7s
Open:	Carl Goldberg, Chicago, Ill.	45.4s

Class B

Junior:	Robert Gelbard, Chicago, Ill.	49.2s
Senior:	Wallace Simmers, Chicago, Ill.	58.4s
Open:	Carl Goldberg, Chicago, Ill.	47.5s

CABIN FUSELAGE, R. O. G.

Class B

Junior:	John S. Stokes, Jr., Huntingdon Valley, Pa.	14m 15.3s
Senior:	Charles Hertz, Philadelphia, Pa.	13m 12.2s
Open:	John Ginetti, Atlantic City, N. J.	17m 48.6s

Class C

Junior:	John Stokes, Jr., Huntingdon Valley, Pa.	15m 05.6s
Senior:	John Haw, Philadelphia, Pa.	17m 14.8s
Open:	Henry Struck, Jackson Heights, L. I., N. Y.	16m 01s

CABIN FUSELAGE, R. O. W.

Class B

Junior:	Matthew S. Smith, Washington, D. C.	7m 50s
Senior:	Sidney Axelrod, Chicago, Ill.	6m 32.2s
Open:	William-Latour, Philadelphia, Pa.	5m 42s

AUTOGIROS, Launching Optional

No Classes for Size

Junior:	Milton Huguelet, Chicago, Ill.	4m 29.2s
Senior:	Richard Obarski, Chicago, Ill.	2m 26.5s
Open:	Carl Goldberg, Chicago, Ill.	54s

HELICOPTERS, Launching Optional

No Classes for Size

Junior:	Ralph Brown, Arlington, Mass.	2m 15.5s
Senior:	Richard Obarski, Chicago, Ill.	4m 35s
Open:	Carl Goldberg, Chicago, Ill.	2m 46.2s

ORNITHOPTERS, Launching Optional

No Classes for Size

Junior:	Milton Huguelet, Chicago, Ill.	1m 36.8s
Senior:	Dennis Turner, Chicago, Ill.	4m 19.2s
Open:	Carl Goldberg, Chicago, Ill.	1m 28s

*Indicates new national indoor records established since listing of March 1, 1938.

OUTDOORS

STICK MODEL AIRPLANES, Hand-Launched

Class C

†Junior:	Mike Gaydos, Akron, Ohio.	5m 19s
†Senior:	Robert Hoffmeyer, Jr., Akron, Ohio.	10m 24.4s
†Open:	Conrad Renning, Minneapolis, Minn.	5m 26.4s

Class D

†Junior:	Robert Abrahamson, Arlington, Mass.	1m 18.6s
†Senior:	Robert Jacobson, Philadelphia, Pa.	6m 36.4s
†Open:	Henry Stiglmeier, Inglewood, Calif.	4m 07.8s

STICK MODEL AIRPLANES, R. O. W.

Class C

†Junior:	Martin Phillips, Everett, Mass.	30.0s
†Senior:	Stanley Stanwick, Cambridge, Mass.	40.0s
Open:	None Established	

Class D

†Junior:	Martin Phillips, Everett, Mass.	20.5s
†Senior:	Eward Whitten	59s
Open:	None Established	

GLIDERS, Hand-Launched

Class B

†Junior:	Martin Phillips, Everett, Mass.	55.4s
†Junior:	Edward Domohowski, Hyde Park, Mass.	1m 04.9s
†Senior:	Henry Gerrin, Malden, Mass.	52.8s
†Senior:	Henry Gerrin, Malden, Mass.	2m 19.9s
†Open:	John Dahl, Manchester, Conn.	26s

Class C

Junior:	None Established	
†Senior:	Roy Carlson, Springfield, Mass.	47s
†Open:	L. G. Townsend, Roslindale, Mass.	36.5s

N. A. A. News

(Continued from page 23)

on this route. He has been a clipper pilot for eight years. Certainly with such inspiring speakers, an active interest in model and full-scale aviation should produce results. The school will be open to all young men in the city. Subjects to be taken up include the history of aviation, air commerce regulations, licensing of aircraft, operation of aircraft, licensing of pilots and mechanics, aerodynamics, theory of flight, materials and construction, maintenance and inspection, engine, ignition, carburetion, air traffic rules and airways control. Might be worth your while to drop in at Rockford. . . . We point with pride to a contest director who does not often get into these columns because he is . . . how you say? . . . "a little backward about coming forward." However, our superbly trained staff of reporters have uncovered the fact that Carl Hopkins of Clarksburg, West Virginia, has been doing a mighty fine job of creating and supporting interest in model aviation in his section. Mr. Hopkins is forever organizing meets and such for the benefit of his flyers; if he hasn't just had one he is on the point of having one . . . one of his prettiest and most recent tricks was to fasten a dozen or so gas model ships to the tops of cars that were in the local Armistice Day parade, and roll them down the line of march with the throttles wide open. Must have been quite a sight.

Milwaukee is at it again. Contest director Harold J. Sinskey has written to inform us of an exposition for the purpose of promoting interest in hobbies and recreational activities for boys and girls, men and women, which was called the "Wisconsin Hobby Exposition." Charles F. Higgins, counsel for the Milwaukee chapter, was chairman of the executive committee. There was a booth devoted to N.A.A. activities, one of the features of which was a large work table where two or three builders were working on ships so the public could see how it was done. It is our guess that they spent more time answering questions than they did in working. The exposition was scheduled for November 24, 25, 26 and 27, in the Milwaukee Auditorium . . . an intensive study in designing, construction, and finishing gas model airplanes has been planned for the fall and winter months at the Northern Indiana Gas Model Association Headquarters, 4490 Broadway, Gary, Indiana. Motion pictures of construction, adjusting and flying will be presented, and foremost leaders in this field will give instructive blackboard talks to the club at regular two-week periods.

. . . Ralph Pressler of San Antonio, Texas, writes in with this interesting note. . . . "One thing—our gas model weather down here in San Antonio is swell, and, we are proud to state, continues with but very little change, right on through the winter . . . I am sure the good gas modeling weather we enjoy here is something that many other modelers throughout the country might well be envious of." You don't know the half of it, Ralph; we're

catching the next train! . . . More meets at Syracuse, N.Y.; Milwaukee, Wisconsin; Allentown, Pa. . . . It will be noticed that quite a few chapters are conducting study courses for the winter months. It's a good idea, and one which pays dividends, since it deals with aviation and yet keeps the modeler's mind from too much concentration on his microfilm, etc., and enables him to return fresh to his activities in the following spring.

C. Nelson Black, of Hartford, Conn., is serving notice on behalf of his chapter that the boys are out for some of those indoor records . . . pretty spirited group up there in Connecticut. They mean to go places . . . better raise your own records a couple of minutes if you don't want to see them go.

The first official meeting of the Northwest Gas Model Airplane Association, headquarters at Yakima, Washington, was held October 15. Dick Megorden, of the Yakima Gas Model Airplane Assn., long known for his leadership in that section, was unanimously elected president of the association. They're pulling together in fine style, and have a point system for award of trips to the '39 Nationals which is worth duplicating. Anyone interested can get information by writing to Mr. Megorden, Box 178, Yakima, Washington. The Association is composed of gas model clubs in Seattle, Portland, Spokane and Yakima. Any clubs in the territory who are interested are invited to join . . . At the first annual Trans-Mississippi Gas Model Airplane Contest, held at Omaha, Nebraska, on October 23, there appeared a new and novel idea. Souvenir programs were on sale, which gave you information on just about anything you could ask. Included in the program were rules governing the meet, outline of activities, prize list, special awards, list of contestants with their club affiliation and N.A.A. number and a space for the times chalked up, etc., etc. Advertising also played a big part in the program. Large meets could do well to supply the same information to onlookers, while a mimeographed sheet or two should serve the purpose for smaller meets. The large crowds usually attendant at gas model meets come mainly to watch the flights. If they were supplied with definite, informative facts to "sink their teeth" into, it is probable that model aviation would receive more active public support in more ways than one.

The Syracuse Model Chapter will sponsor an indoor elimination meet to be held February 26, 1939, at the Syracuse Armory under the direction of Harry C. Copeland. Point awards for 1939 National trips.

Class D

Junior: None Established
†Senior: Frank Staelens, Dorchester, Mass. — 22.4s
Open: None Established

GLIDERS, Tow-Line

Class C

Junior: None Established
†Senior: Roy Carlson, Springfield, Mass. — 1m 13.8s
†Senior: Robert Abrahamson, Arlington, Mass. — 2m 57.4s
†Senior: Robert Abrahamson, Arlington, Mass. — 4m 22.1s
Open: None Established

Class D

Junior: None Established
†Senior: Warren Shea, Jersey City, N. J. — 2m 45s
†Open: Frank Ehling, Jersey City, N. J. — 47s

Class E

Junior: None Established
†Senior: Walter Eggert, Jr., Philadelphia, Pa. — 8m 40s
Open: None Established

CABIN FUSELAGE, R. O. G.

Class C

†Junior: Henry Borcynski, Hartford, Conn. — 2m 30s
†Senior: John L. Ogilvie, New York City — 14m 55.8s
†Open: Henry Stiglmeier, Inglewood, Calif. — 8m 00s

Class D

†Junior: Arthur Beckington, Rockford, Ill. — 31m 08s
†Senior: Leo Bailey, Akron, Ohio — 23m 35.8s
†Open: Frank Zaic, New York City — 17m 06.2s

Class E (Gas)

†Junior: George Gerpheide, Kalamazoo, Mich. — 1m 37.2s
†Senior: Ed Manthey, Maywood, Ill. — 6m 50s
†Senior: Carl T. Phenix, Galveston, Texas — 46m 5s
†Open: Milton Kahn, Philadelphia, Pa. — 23m 41.4s

CABIN FUSELAGE MODELS, R. O. W.

Class C

Junior: None Established
†Senior: Harry Lerman, Malden, Mass. — 48.5s
Open: None Established

Class D

†Junior. Edwin Gilcher, Stoughton, Mass. — 1m 01.5s
Senior: None Established
Open: None Established

AUTOGIROS, Launching Optional

No Classes for Size

Junior: None Established
†Senior: Harry Lerman, Malden, Mass. — 5.0s
†Senior: Harry Lerman, Malden, Mass. — 14.5s
Open: None Established

HELICOPTERS, Launching Optional

No Classes for Size

†Junior: Martin Phillips, Everett, Mass. — 8.2s
†Senior: Robert Reed, Mattoon, Ill. — 25.8s
†Senior: Harry Lerman, Malden, Mass. — 1m 46.1s
Open: None Established

†Indicates new national records established under new outdoor rules passed March 12.

SPECIAL TO MODEL AIRPLANE NEWS:

THOMPSON Trophy Winner Roscoe Turner's new 400 miles per hour racer has at last been financed by an undisclosed organization. It is a comparatively conventional low-wing featuring the new Allison 2300 horsepower in-line engine. Release from the War Department of this engine is still pending. However, his plans for a new 500 miles per hour creation are startling and several astounding new scientific engineering principles of design are incorporated. It will call for an outlay of one hundred thousand dollars, an "angel" for which has as yet been uncorralled.

Lockheed, whose model "14" is outselling any comparable twin-engine transport on the market, has approximately thirty million dollars worth of back-log orders. This includes four for Polish Air Lines, three for the French Air Ministry (for Air Afrique, Europe to Africa routes) and a batch of fifty bomber conversions for the Australian Air Board. First of the Royal Air Force's two hundred are now enroute to Lockheed's special overseas crew in England for assembly and tests at Farnborough. Vought, Boeing and Martin please note: These amazing sales may be directly attributed to dynamic, wiry C. F. Nielson, Lockheed's clever export manager, whose gift for organization, alertness and sheer salesmanship have boomed Lockheed into a new 3/4 millions expansion of the plant. Three thousand employees, with a call for as many more, are now toiling in three daily shifts. Lockheed's new fighter, announced exclusively in *Flash News* last month, is still very much hush-hush.

North American, Lockheed's only export rival, has a neat one thousand of the popular, ubiquitous NA-16 series now at work or in enroute construction. Latest attack on Lockheed's bomber market is North American's new bomber: a sleek, mid-wing, twin-engine, three-four place utility weapon. Considerably smaller than the huge "Dragon," which failed in competition with the B-18 (Douglas) and 166 (Martin), this latest purvayor of destruction is a light, amazingly fast, all-metal creation featuring a nose gunner-bombardier, a pilot-chief officer situated in a narrow glass-enclosed hatch on the turtle back, and a rear gunner with above and below accommodations. It will not be offered to Uncle Sam (whose Air Corps obstinately admires the giant B-15, et al) but will be demonstrated ab initio to interested foreign governments who are clamoring for this identical type.

Worst of Africa's air tragedies and a blow to the Junkers Works was the crash of their huge, four-motored 40 passenger trans-Atlantic airliner, JU-90, at Bathurst, Gambia, West Africa.

On board were no lesser famed pilots than Lufthansa's Herren Blankenburg, Untucht and Kindermann, who met violent, unexpected death along with eight engineers of the Junkers concern when the behemoth crashed into a palm tree on a take-off and caught fire. Although another ship is nearly complete, Germany's indomitable conquest of the Atlantic is blocked temporarily. However, no mid-winter experiments are ever conducted.

England's capture (in triplicate) of the world's non-stop flight record was accomplished on November 7th last with a spectacular 7,162 miles from Ismailia, Egypt, to Darwin, Northern Australia, beating by 856 miles and 14 hours the flight of Russia's ANT-25 from Moscow to San Jacinto, California, in July last year. Featured was the Vickers-Wallis geodetic construction (basketwork) on the Vickers "Wellington"; an aspect ratio of nine; (Uncle Sam's best bet, the XBLR-1,—Boeing XB-15—has an AR of only 6-1/2) a Bristol "Pegasus" XXII, take-off 1010 horsepower, nine cylinder, air-cooled radial; a gross weight of 19,000 pounds; a Rotol controllable pitch three-bladed all-metal propeller; and the new Claudel-Hobson automatic carburetor, which made adjustment unnecessary. Pilot, second-pilot and radio-navigator in the hull comprised the crew. Theoretically a wing of geodetic construction may be of infinite span. Thick, weighty wings are not necessary to support the span, nor is a long, heavy empennage for control required. Further development is now on tap and an American manufacturer is reported seeking rights for its use. Is of no advantage in small fighting ships or similar craft under an aspect ratio of five or less.

Seversky's latest is a 330 miles per hour tricycle seating a pilot and two passengers. Follows the "Executive" plan closely. All three wheels are, needless to state, completely retractable. (Main wheels fold inward instead of to the rear as on present models.) Powered by a 1200 horsepower P&W Twin Wasp Senior streamed into the fuselage behind a huge nose spinner cap. Additional control surface is added just below the rudder. Uses the new N.A.C.A. nose slot cowling and will be ready early next spring. The adventurous, inimitable Mr. Doolittle and two others have already booked orders. It is the first high speed ship to use the tricycle design, a veritable deluge of which is promised in the coming year.

Powered by a 1200 horsepower P&W Twin Wasp Senior, these low-flying troop-demolishers will have intensely revamped hatches and crew quarters and will be redesigned in the nose and streamlining details. The Y1A-19 should be 260 miles per hour of comparatively slow but wicked flying punishment.

Eight Short Sunderland flying boats (military versions of the highly publicised Empire) are now stationed at Singapore, British Malaya. Not unlike our supposedly radical Consolidated XPB2Y-1, the Sunderland was designed and constructed with little ballyhoo and went into service as a tremendously potent long-range bomber-coastal patrol type. Power is four Bristol "Pegasus" engines of 925 horsepower each and the top speed is well over 200 miles per hour. Dimensions are: Span, 114 feet; length, 85 feet; and height, 33 feet. Scored are power-operated gun turrets in the bow and tail implacements. A landplane, heavy-duty bomber adaptation of the Sunderland is now in the process of construction.

Also from England: The Bristol "Blenheim" has at last received an efficacious face lifting. Its blunt, slanted nose (in comparison with Boeing and Douglas' long, full gunners' office) was cramped, ineffective quarters for decent gunnery operations. It has now been lengthened by no less than three feet and fully glassed in. A hollowed out section for pilot view forward has been extended throughout the length of the nose on the port side. The Royal Air Force claims its 295 miles per hour top speed rates it the fastest service bomber among the nations. The French Amiot 371 (MODEL AIRPLANE NEWS, December, 1938) and German Junkers JU-86K and Focke-Wulf might dispute this claim. Eight "Blenheims" were recently exported to the Turkish Air Force.

The wing centre section of the monoplane is built integral with the fuselage and is characterized by a sharp dihedral angle from a point one-third out from the fuselage. The pilot is situated well to the rear and is completely enclosed. Armament aboard is made up of twin banks of machine guns mounted in the leading edge of the wing and firing outside the propeller arc. Power is gleaned from an Hispano-Suiza series Y avec moteur canon (an obviously popular French motor) with the additional armament of the shell gun. Top speed with full military load is 278 miles per hour and it has a ceiling of 29,400 feet, amazing for a seaplane. This is the third modification of the model 21 and further experimentation is being conducted at the 4, Rue de Teheran, Paris plant of the firm, on the development of such an unorthodox aerial weapon.

France has just been licensed to construct all Pratt & Whitney engines, the first of which (Twin Wasp Senior, 1000 horsepower) will go into service aboard the racy Marcel Bloch 151, single-seat fighter, which mounts two aero cannons in the wing leading edge just outside the propeller arc. The craft was originally powered by the puissant Gnome Rhone double row and is the first fighter to be equipped with wing cannons in pairs.

Lockheed's latest, her sleek new Model 27, will be in the air early next spring, it was reliably reported at the Burbank plant. The craft will follow construction as well as outline details of the popular model 14. However, it will be still larger,

seating eighteen passengers in addition to a crew of three. Several new type aerodynamic improvements will make their initial appearance in accordance with the company's policy of actually putting theoretical appliances into practice. (The Fowler Flaps being an example.)

Watch for Seversky single-seater and convoy fighters on the continent early next Spring. Major Alexander P. de Seversky has just sailed on the "Normandie" with his chief test pilot, Frank Sinclair, and two of his latest fighting ships aboard. The huge liner was delayed a full half hour loading the trim sky terriers. Sacha will view the important Paris Air Show before embarking on a demonstration tour of Europe. He has not as yet decided to include Russia, Germany or Italy on the booking swing.

From lurid, astonishing Germany: The Messerschmitt BF-110, a twin-engine monoplane powered with two Daimler-Benz "V" inverted liquid-cooled DB-601 engines developing 1360 horsepower each. Top speed: 400 miles per hour! Two aerial cannon shell guns do the lethal work. The Focke-Wulf pusher carries on the work Messrs. Hanriot-Biche in France, DeHaviland and Vickers in England and Savoia-Marchetti in Italy pioneered in the realm of pusher fighting aircraft.

Our High Revs and Clogged Carburetors Department

High Revs to our contemporary and good friend Cy Caldwell for his well timed and outspoken blast at the Royal Aero Club's dinner on October 27 last. His straightforward and unreserved condemnation of the Royal Air Force's structure and equipment was equitable and was taken in gracious good humor by those leaders of British Aviation who were present. Several high authorities answered him in like kind, among whom were no less scintillating aeronautical lights than Sir Charles Bruce Gardner, Sir Robert McClean, and the esteemed Mr. Oswald Short. After vehement reprisals from those present, Cy at last achieved the admission he had come seeking: the superiority of American military aircraft and organization.

Clogged Carburetors to those who (and we decline to open old wounds) refused recently to reconsider Germany's appeal for helium to lift her new Graf Zeppelin LZ-130, which has just been completing test flights and is being readied for commercial service. We shudder to advocate the conviction that a repetition of the Hindenburg's ghastly and disastrous end is unavoidable. Germany has resolutely and admirably set about the job of making this newer and more beautiful Graf Zeppelin as safe a sky giant as is possible under the circumstances. Experimentation with means of grounding, efficiently and with finality, the various spark discharges about the hull is being continued. Power is supplied by four Daimler-Benz sixteen cylinder water-cooled heavy oil engines of 800 horsepower each. The craft is 803 feet long and 145½ feet high.

—AMERICA FIRST IN THE AIR—

NEW SCIENTIFIC "COMMODORE" GAS MODEL SWEEPS THE COUNTRY!

COMMODORE DeLuxe Gas Model

THIS MODEL IS THE SUPREME ACHIEVEMENT IN GAS MODEL DESIGN

SPECIFICATIONS
Wingspan.....6 feet
Overall Length.....50"
Total weight with motor and ignition mounts.....3½ lbs.
Glide Ratio.....16 to 1
Rate of Climb.....
App. 700 ft. per min.

The new Scientific Commodore gas model has been designed by the well known "Eaglet" gas model designer, Mr. Ben Shereshaw. In this new model Mr. Shereshaw has combined all his knowledge and efforts to build what we believe the finest gas model in America.

Any inexpensive ⅓ horsepower engine may be used. On many test flights the "Commodore" was powered very successfully with the Brown Jr. Model D engine. Other engines such as the Brown "B", Ohlsson, Midget, Gwin, Dennymite, Syncro, or any other reliable make motor may be used with success.

KIT IS 100% COMPLETE, including highest quality sheet and strip balsa, finest spring steel wire, all metal fittings, ignition wire, large full size plans with explicit instructions, all necessary liquids, etc., etc.

Complete Less Wheels **$6.95**

Complete including Pneumatic Wheels **$7.95**

PRICES ARE POST-PAID LESS MOTOR

The EAGLET — A NEW SMALL GAS MODEL

44" Wing—Length 32"

Flying Weight 17 ozs.

Truly the Finest Midget gas Job Offered to the Gas Model Builder Today.

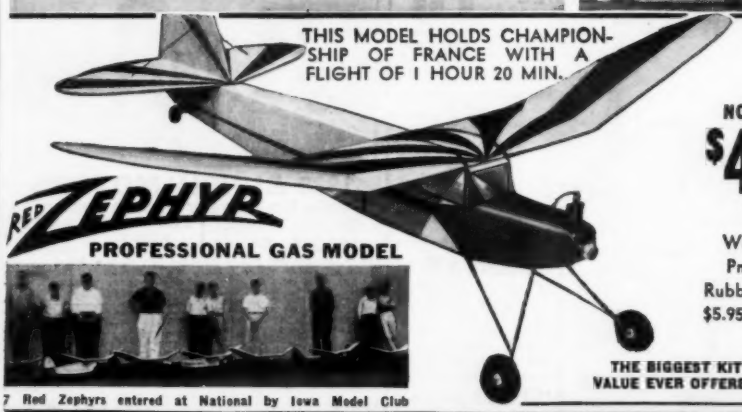
DESIGNED FOR USE WITH MIDGET GAS ENGINES

The trend in the size of gas models today is toward a ship of about three to four feet wingspan, and corresponding light weight.

Even novices will find the "Eaglet" easy to assemble. The "Eaglet" won 2nd and 3rd places at recent Philadelphia gas meet, losing first place by only 4 seconds. Flew out of sight in 2 min. 12 sec. on only 25 second motor run.

$3.95 POST-PAID

Or At Your Dealer's



THIS MODEL HOLDS CHAMPIONSHIP OF FRANCE WITH A FLIGHT OF 1 HOUR 20 MIN.

RED ZEPHYR

PROFESSIONAL GAS MODEL

NOW ONLY **$4.95** POSTPAID (Less Wheels and Motor)

With 3½" Pneumatic Rubber Wheels $5.95 postpaid

THE BIGGEST KIT VALUE EVER OFFERED

7 Red Zephyrs entered at National by Iowa Model Club

MISS AMERICA GAS MODEL BREAKS WORLD'S RECORD!

NOW HOLDS WORLD'S RECORD WITH FLIGHT OF 46 MINUTES ON 27 SECOND MOTOR RUN.

Word has just been received from N.A.A. headquarters at Washington confirming this flight made by Mr. Phenix of Houston, Texas.

Kit is 100% complete with 3½" Pneumatic wheels, 7 ft. wing; wt. (less motor) 2¾ lbs. 22 min. on one oz. fuel; 18 to 1 Glide.

$7.50 P.P.

THE STREAMLINER

Wingspan 6 Ft. Length 43"
Weight (less motor) 2½ lbs.

Has detachable wing, adjustable rudder control, and stamped nose cowling which completely hides engine—with hinged hatch for accessibility.

COMPLETE KIT with Ready-made balsa ribs, Stamped Metal nose cowling, liquids, all balsa cut to correct sizes, nuts, bolts, electrical connections, celluloid, rubber, bamboo paper, large full size detailed plans giving every bit of information needed for building and flying the "Streamliner."

Complete kit, less wheels, at your dealer or direct, only.....postpaid **$4.95**

Complete kit, including a pair of 3½" pneumatic rubber air wheels, only.....postpaid **$5.95**

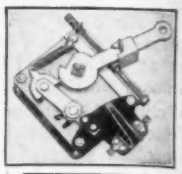
SCIENTIFI TO GREA

Here Are

SCIENTIFIC GAS MODEL SUPPL ARE GUARANTEED SATISFA TORY OR MONEY REFUNDE

SCIENTIFIC WHEELS

Absolutely puncture-proof—leak-proof. Per Pair $1.50 P.P.



WORLD'S FINEST QUALITY FINISHES

Clear Dope, Colored Dope, Thinner, Cement, Heavy Cement, Bamboo Cement, Banana Oil

2 oz. bot.	$ .25
½ pt. can	.50
1 pt. can	.75
1 qt. can	1.40

PROP. SPINNER.....30

BALSA WOOD 5 Ft. Lengths

1/8x1/8	$ .02
1/8x1/4	.04
1/8x3/8	.06
1/8x1/2	.08
3/16 sq.	.04
3/16x1/2	.08
1/4x1/4	.06
1/4x3/8	.08
1/4x1/2	.10
3/8x3/8	.10
3/8x1/2	.12
1/2x3/4	.15

Sheet Balsa

1/32x2	.10
1/32x3	.15
1/16x2	.12
1/16x3	.18
1/8x2	.15
1/8x3	.20
3/16x2	.18
3/16x3	.25
1/4x3	.20
1/4x5	.25
1/2x2	.25
1/2x3	.35

CYCLONE NEEDLE VALVES

Each.....$ .50

NOW ONLY **$2.00** Postpaid

NEEDLE VALVE AND BODY

For Brown, Mighty Midget, Ohlsson, Brat, Trojan, M&M, Syncro, etc. Mention type wanted.

Needle Valve.....50c
Body.....50c

STORAGE BATTERY

Packed in carton with bottle of distilled water and recharging bulb. Price **$2.50** postpaid.

TINY-TOT TIMER

A High quality light weight timer. Only **$1.95** postpaid.

VALVO-LINE OIL

Finest quality SAE 70 for all gas engines. Large bottle with instructions.....20c

TRU-PITCH PROPELLERS

13"	$ .75
14"	.75
15"	1.00
16"	1.25

FUNNEL

With filter Screen Each....30c

SPRAY GUNS

Small $ .89
Large $1.19

JACK & PLUG

Each piece.....10c

TOGGLE SWITCH

35c each

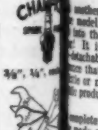
NEW MODEL YEAR BOOK—BY ZAIC

By Far The Best!

160 pages of priceless data and plans, almost 100 detailed drawings of up-to-the-minute models. Every gas model fan should have a copy. **Only $1.00 Postpaid**

HOW TO ORDER

Add 15c to orders up to $1.50. On orders over $1.50, add 10% of order. Orders amounting to $4.00 and over are sent postpaid. All SCIENTIFIC Kits and Gas Motors are sent postpaid. All orders shipped same day they are received.

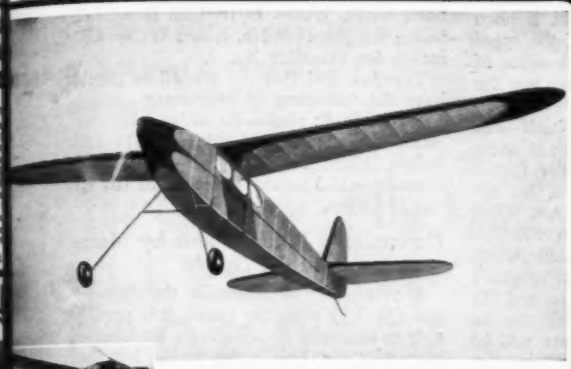


SCIENTIFIC M

218-220 MA-2 Market Street

In England: Model Supply Stores, 17 Brazennose St.
In Australia: Swift Model Aircraft, 158 Adelaide St.

FMODELS ZOOM
AR POPULARITY
re d-Breaking Values!



"ORIOLE" CONTEST ENDURANCE MODEL

Flies 2 to 3 Miles: Overall Length 34"

0" WINGSPAN

LY $1.00

paid

At Your Dealer

So simple, even the beginner can complete the model in a day. This Model will clear the ground in a short take-off and climb with amazing speed. Every detail of the "Oriole" conforms with N. A. A. contest requirements.

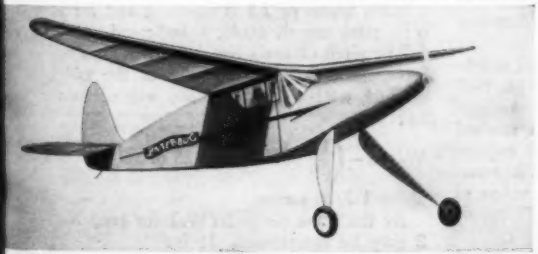
Kit is 100% complete. Black and Orange color motif. All highest quality parts—strip balsa accurately cut to size; ribs, outlines, etc. clearly printed on sheet balsa, formed wire parts, 16" machine cut drilled balsa propeller, cement, rubber, colored tissue, ball bearing washer, spring steel landing gear wire, pair of streamlined wheels, liquids, full size detailed plans with instructions.

THE BIGGEST KIT VALUE IN AMERICA TODAY!

THE NEW

JITTERBUG

ENDURANCE MODEL



25" Wingspan—Length 20½"—Light Weight

FLIES OVER 1 MILE (6,000 feet)

mother famous Flying Model originated and designed by Scientific. This trim en- model can easily fly one mile or more. It speeds along the ground for a few feet, into the sky—spirals up . . . and up . . . then gradually glides to a perfect 3-point . It is one of the slickest looking planes you will ever build! Look at that shapely detachable, too!—that classy little cabin—streamlined nose—that graceful, thoroughbred ures that simply spells "Class" and long flights. The construction is so simple that anyone ttle or no past experience can easily build the "Jitterbug" in a few hours. A guaranteed ng product.

mplete with all materials including streamline wheels and made propeller, full size plans and explicit instructions. **ONLY 50c** Postpaid or at your dealer

ed exceptionally low. Complete kit

C DEL AIRPLANE CO.

"CL HEADQUARTERS"

NEWARK, N. J.

In Finland: O-Y Wiklund, Turku, Abo

In Portugal: Ed Von Hafe, Rua Dr. Miguel Bombarda, 243, Porto

Real Thrills of Gas Model Flight

THEY LOOK, FLY AND SOUND LIKE REAL GAS MODELS

MISS AMERICA

Gas Type—Rubber Powered Model Airplane

40" Wingspan
Weight 4½ ozs.

Length 27½"
Flies 1 MILE (5280 feet)

This is an exact replica of the full size Miss America gas model. Recently a Miss America gas model flew for 46 minutes on a motor run of only 27 seconds, breaking all world's records for so short a motor run.

This new small Gas Type Model has all the features of the large model. It is a real contest flyer and capable of outflying anything in its class. It takes off from the ground within 4 feet and heads straight up, climbing at an unbelievably high rate without the slightest bit of stalling. Can easily be built by a modeler with little or no past experience. On test flights it passed every qualification of the rigid Scientific standards. Contents of Kit 100% complete (similar to parts in Firefly and Flea).

PRICE $1.95 POSTPAID including a pair of M & M pneumatic rubber wheels

THE FLEA

FLIES 1 MILE (5280 ft.)

Wing ..... 36"
Length ..... 28"
Weight ..... 4 oz.

This new type of model airplane developed by Scientific will give you all the thrills and excitement of building a real gas job. Thousands of builders have constructed these remarkable models and gotten truly exceptional flights. Build one yourself now and experience the fun you, too, can have with a fine flyer!

The Flea kit is absolutely complete, containing all balsa parts cut to size, dummy gas engine and spark plug, ball bearing washer, motor hum ratchet device, insignia, rubber, metal parts, liquids, full size plans with explicit instructions. Complete, including a pair of M & M wheels..... **$1.95** Postpaid

Jim Clark's FLEA

Flies 10,000 Feet For World's Record

Akron, Ohio

Dear Sirs:
My Flea model flew for a distance of 2 miles, or about 10,000 ft.! I had launched the model after using a winder and it climbed like an elevator, nosing up steeply but without stalling for a single second.
A perfect flight if there ever was one.
My models from now on will always be Scientific Flyers.
(Signed) James Clark

VALKYRIE

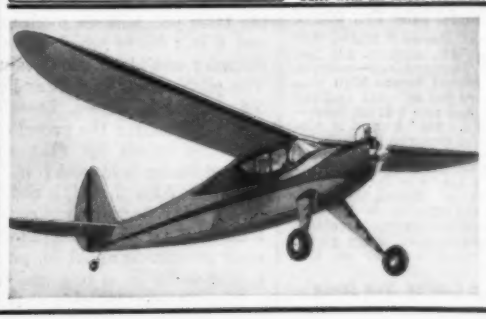
Wingspan 24"
Length 18"
Flies ½ mile

GAS TYPE MODEL

Designed by Indoor Expert Carl Goldberg in miniature duplicate of his prize winning original which won second place at the "National," Detroit, 1937. Can be easily constructed in 4 or 5 hours. Sturdily built with all latest features. Postpaid. **$1.00**

GO TO YOUR DEALER TODAY

See Scientific's Famous Prize Winners: Miss America, The Flea, Valkyrie and Firefly Models.



"FIREFLY"

Wing 38", Length 28"
Wt. 4 ozs.

FLIES 1 MILE (5280 Feet)

The "Firefly" is the next best thing to a genuine gas model. Its advance clean design and beauty will startle you. Think of it—your own gas type model that will soar majestically aloft, steady and graceful as an airliner under expert command! Dummy motor, propeller, full size plans, and a pair of M & M pneumatic rubber wheels. **$1.95** Postpaid

The Procedure of Gas Job Propeller Design

(Continued from page 27)

page 17, November 1938 issue also, though the formula methods are slightly more accurate in many cases. On the graph the correct propeller pitches for various plane speeds are given in the horizontal column above the plane speed column.

Thus for plane No. 1, with a speed of 17.75 m.p.h., the graph indicates a pitch of 7.1 inches. For plane No. 2, the speed of which is 18.5 m.p.h the pitch value of 7.4 inches is given. These values are the same as given by the formula.

Now the problem resolves itself into determining what diameter and blade width the propeller should have in order that it will absorb the power delivered by the motor *when turning at 4000 r.p.m.* (For which propeller speed the pitch was determined.) If the diameter or blade width is made too large the motor and propeller speed will be *less* than 4000 r.p.m. and the pitch speed of the propeller will not be great enough. The pitch therefore will be too low also, and the propeller will not act efficiently. If the diameter or blade width is too small the slip of the propeller will be too large. The plane will have great speed in level flight, but the climb will suffer under these conditions. Thus the correct values of these two factors must be determined with accuracy.

However propeller efficiency dictates that there shall be a definite ratio between propeller diameter and the maximum width of the blades. Thus the fifth step in our design problem is to select an efficient ratio. From practice it has been found that fine results are obtained when the maximum blade width is equal to about 1/10 the diameter of the propeller. This value therefore is a function of (D), the diameter, and may be determined in terms of (D). In other words: $W_b = D/10$.

Now the sixth step is to find out what the diameter should be. From this the value of the blade width may be found easily, (the seventh step). The diameter value may be found in any one of three ways; by means of the tables, from examination of the graph (page 31, Sept. 1938 issue), or by solving a simple formula.

First, let us see what the table method offers. In the left-hand vertical column of the table, page 37, Sept. 1938 issue, locate the horsepower or (C_a) value of your motor. In this case it is 1/5 hp. or a (C_a) value of (0.6).

The pitch of the propeller for plane No. 1 is (7.1) and for plane No. 2 it is (7.4). In the horizontal pitch column at the top of the table you will see pitch values of 6 in. and 8 in.; below which the corresponding diameter and blade width values are given. The pitch of our propellers lie between the 6 in. and 8 in. values. Therefore (D) and (W_b) values for the propeller lie between the table values for (D) and (W_b) indicated in the 6 in. and 8 in. vertical pitch columns. Also the (D) and (W_b) values of our propellers lie between the 6 in. and 8 in. table values for these quantities in the same proportion as 7.1 in. pitch is to 6 and 8, and as 7.6 in. is to 6 and 8.

Now it can be seen that 7.1 in. pitch (plane No. 1) is 11/20 of the interval between 6 and 8. Therefore subtracting from the (D) value in the 6 in. pitch column, 11/20 of the difference between 16.1 and 15 (given in 8 in. column), the correct diameter for propeller No. 1 will be obtained. Thus:

$$D = 16.1 - \left(\frac{11}{20} \times 1.1\right) = 15.5 \text{ in. diameter}$$

Using the same method we find the diamter for propeller No. 2 15.33 inches. As the blade width, $W_b = D/10$, then $D = 1.55$ inches for propeller No. 1, and $W_b = 1.53$ inches for propeller No. 2.

Thus we find that the propellers should have the following specifications:

Plane No. 1: pitch=7.1 inches; diameter =15.5 inches; blade width (max.)=1.55 inches. Plane No. 2: pitch—7.4 inches; diameter=15.3 inches; blade width (max.) =1.53 inches.

Determining Blade Width by Means of the Graph

If you prefer to determine the diameter and (W_b) by using the graph, it is possible only to approximate a diameter blade width ratio of (10). This is due to the fact that the graph is for a pitch of 8 inches and the correct blade width must be determined after the diameter for an eight inch pitch has been selected.

Suppose we proceed to find the required factors by this method. This will make the problem clear to you.

First, on the graph page 13, May 1938 issue, locate the horizontal line representing 1/5 hp. Next find the point at which it intersects line B, the (D/W_b) ratio of 10 for a pitch of 8 inches. From this point follow vertically downward to the diameter column at the lower edge of the graph. Here you will see that a diameter of 15 inches is specified.

Now locate the dotted diagonal curve which passes through or near the intersection point of the horsepower line and vertical diameter line. Line No. 4 passes through this point. Follow along this line to the pitch table. For an eight inch pitch a blade width of 1.5 is specified and for a 6 in. pitch one of 2.0 in. is indicated.

The pitch of prop No. 1 is 7.1. Then by interpolation, as in the case of the table method, we see that the blade width should be:

$$W_b = 2 - \left(\frac{11}{20} \times 0.5\right) = 1.725 \text{ or}$$

about 1 7/16 inches.

By the same method (W_b) for prop No. 2 may be determined. It is:

$$W_b = 2 - \left(\frac{14}{20} \times 0.5\right) = 1.65 \text{ inches.}$$

Thus by this method it is found that characteristics of a propeller with an approximate (D/W_b) ratio of 10 should be:

Plane No. 1: Pitch=7.1 in.; Diameter =15 in.; Maximum blade width=1.725 in.

Plane No. 2: Pitch=7.4 in.; Diameter= 15 in.; Maximum blade width=1.65 inches.

Calculation of these propeller factors by means of the formula method is probably the simplest and most exact manner of procedure. Unless you have a strong distaste for mathematics it is advised that you use it although the two methods described here will give accurate results. It will be used

Put Your Model Building Time and Talent to Worth-while Use This Year—by building really worth-while models!

Cleveland Models are First Choice among Leading Builders, because they're the last word in detailed construction—the last word in authentic realism

Every Kit listed in this column bears the Cleveland "Red Seal" of Approval. They're All Deluxe Kits

Douglas Transport

"The Gas Buy of the Year"

CLEVELAND'S CLOUDSTER ★

Complete except for dope, cement, wheels and power unit only

Includes adjustable wings and stabilizer; name plate for the fin, with space for your name and address in case the model is lost. Span of 50", length 31". Kit contains all necessary balsa, everything needed printed out, with full size C-D drawings, celluloid, shaped leading edge, music wire, nuts, bolts, washers, etc. Dry Kit No. GP-5004.

$2.50

2 More Cleveland Prize Winning Gas Models

RELIANT—Dry Kit GP-66, postfree, only $8.50 (82" span). REARWIN SPEEDSTER—Dry Kit GP-69, postfree, only $4.85 (64½" span). In accordance with C-D's gas model policy, the motor unit with propeller, wheels and wheel shoes are not supplied with Kit (this gives model builders their choice on these items). Extra parts to complete GP-66 (except power units) $3.95; extra parts to complete GP-69 (except power unit) $3.55. Add 85c to either parts Kits (or $1.50 with dry kits) if you wish 3½" air-wheels instead of wood wheels.

● If you want us to include all dopes, cements, and rubber gas model wheels with your order, add $1.75 to the $2.50 price; and of course, if a motor is desired, send for this right with the Kit. All standard makes in stock at regularly advertised prices.

Complete Gas Models (Except Power Unit)

Howard D.G.A.-8 span 6'-4"	$12.50
Fairchild Ranger "24" span 6'-8¾"	9.95
The Midget Hawk, span 45"	3.95
The Luscombe Phantom, span 6'-4"	13.95
Art Chester's (Jeep), span 71½"	11.95
The Monocoupe 90-A, span 76"	12.50
Pages Navy Racer, span 72"	9.85
New Taylor Cub, span 79½"	8.50
The Silver Flyer, span 6'	6.50

Model Builders Never Before had a catalog like this one!

Contains 3 great lines of 135 C-D airplanes, also 5c gliders and 10c and 25c airplanes for beginners and larger ready-to-fly models. Also model railroad equipment and toy trains, 20c up in 0, C-D, 00, and HO gage; a wide variety of gas model airplanes and all well-known makes of gas engines; gas and "rubber driven" supplies; also "general" supplies for railroad and innumerable model uses; race car; hand tools and power machinery, fine cameras, telescopes, microscopes and a wide variety of ship kits and fittings. Nearly everything a real model builder could wish for within its pages for only one thin dime. Send your 10c today!

DEALERS: Write Immediately for details

Ordering Instructions: See your dealer first—if he can't supply you, send check or M. O. (cash at own risk) with 15c for packing and postage. No C.O.D.'s. Outside U. S. add 10% extra. Include 10c for our new BIG Catalog, if you haven't already sent for it.

Cleveland is America's "Gas Model Center"

Brown Jr. Model D, postfree	$10.00
Brown Jr. Model C, postfree	17.00
Brown Jr. Model B, postfree	21.50
Syncro Ace Motor, postfree	13.75
Ohlsson Motor, postfree	18.50
Standard Airstream Dennymite Motor, postfree	15.85
Above Motor (S. A. Dennymite) less coil and condenser	13.85
De Luxe Airstream Dennymite, Incl. Duraluminum Mount, Etc., postfree	17.85
All motors complete as usual, except S.A.D. as indicated.	
Cadet Starter, only	3.00

Build these Big De Luxe Cleveland Flying Models

Every Kit is super complete in everything needed. Nothing else to buy!

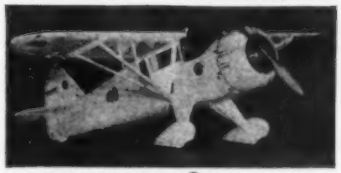
FAMOUS LOCKHEED ELECTRA

GOSHAWK FIGHTER

CURTISS HAWK

DOUGLAS O-38

DOOLITTLE'S GEE BEE

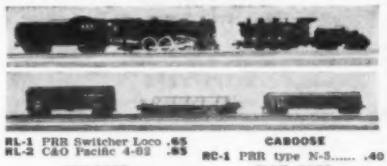


EVER POPULAR "MR. MULLIGAN"

DLSF-1 Great Lakes Trainer	$2.00
DLSF-2 '29 Travel Air Mys. Ship	2.50
DLSF-17 '31 Bayles Gee-Bee Racer	1.95
DLSF-19 Supermarine S6-B	2.25
DLSF-21 Curtiss Hawk P6-E	3.00
DLSF-27 '32 Doolittle's Racer	1.95
DLSF-35 Boeing Transport	6.25
DLSF-40 Famous Aeronca Sport	1.75
DLSF-42 Howard Racer "Ike"	1.25
DLSF-43 Army Douglas O-38 Ooe	3.50
DLSF-45 Martin Bomber MB-2	6.50
DLSF-46 '30 Laird "Solution"	2.00
DLSF-47 '33 Wedell's Own Racer	2.50
DLSF-48 '34 Turner's Wedell-Wm's.	2.50
DLSF-49 F11C-2 Navy Goshawk	3.50
DLSF-52 Howard's "Mr. Mulligan"	2.50
DLSF-60 Army P26-A Fighter	3.00
DLSF-61 Seversky P-35 Fighter	3.00
DLSF-63 '36 French Caudron	2.00
DLSF-71 '37 Folkert's Special	2.00
DLSF-72 '38 Turner-Laird Racer	2.50
DLD-35 Boeing Transport	2.75
DLD-45 Martin Bomber-2	2.75
DLD-53 Douglas Transport	3.25
DLD-63 Lockheed Electra	2.75

C-D GAGE RR MODELS GAINING IN POPULARITY

There are more C-D Gage systems under construction today than in any other gage. Don't be sorry you didn't start in this gage. All kits are 3/16" scale for ⅞" gage. Average over all sizes—Locomotives, 12"-17"; Passenger Cars, 15"; Box Cars, 8"; height 2½". Kits are complete with sides, tops and ends printed in authentic colors and lettering. By simply employing working couplers, detaching dummy trucks and replacing with actual working trucks, all "REP" (cars only) models may be used in your operating layout.



RL-1	PRR Switcher Loco	.65	
RL-2	C&O Pacific 4-62	.85	
BOX CARS			
RB-1	NYC—40 ft. steel	.40	
RB-2	B&O—40 ft. steel	.40	
RB-3	B&O—40 ft. wood	.40	
RB-4	Rock Is. 40' wood	.40	
RB-5	Wabash—40' wood	.40	
RB-6	SP 40' wood furn.	.40	
RB-8	T&P 40' wood auto.	.40	
RB-9	AT&SF 40' wood.	.40	
RB-11	U.P.—50' steel	.45	
RB-12	AT&SF 50' auto	.45	
55 T TWIN HOPPER CARS			
RH-1	CCC&StL RR	.35	
RH-2	Missouri Pac. RR	.35	
RH-3	Southern Railroad	.35	
RH-4	Illinois Central RR	.35	
CABOOSE			
RC-1	PRR type N-5	.40	
FLAT CARS			
RF-1	C&NW 46' 50 ton	.25	
RF-2	PRR 46' 50 ton	.25	
RF-3	B&M 46' 55 ton	.25	
RF-4	L&N 46' 50 ton	.25	
GONDOLA TYPE CARS			
RG-1	L&N 41' 50 ton	.35	
RG-2	NYC 41' 50 ton	.35	
RG-3	MC 41' 55 ton	.35	
RG-5	PRR 65' 70 ton mill type gondola	.45	
8000 GAL. TANK CARS			
RT-1	Texaco—TCX (wh.)	.35	
RT-2	NATX (black)	.35	
RT-3	Sinclair—SDRY	.35	
RT-4	Gulf—CRCX (blk.)	.35	

Operating Cars for any of the above cars only Each $1.25

CLEVELAND MODEL & SUPPLY CO., INC.

Leading the Model Industry—"Since 1919"

4508-C6 Lorain Avenue, Cleveland, Ohio, U. S. A.

to determine the propeller characteristics in the next issue. Also, a complete description will be given of how to lay out the propeller blocks from which the propellers may be cut.

Hidden Wings of the Army

(Continued from page 5)

places with the pilot, the radio operator can man the guns; all stations have intercommunication. The advantageous location of the wing gunners in front of the engines permits them to see the pilot, making visual signals practicable between all members of the crew.

There is little doubt that the army will purchase a great number of these new attack ships, which is proof enough of their superiority in the air.

An even later plane which is expected to be a new "first" in pursuit aviation is the small, bull-dog looking P-37, a low-wing single-motored Curtiss fighter. This plane of all-metal construction is powered with the largest liquid-cooled engine ever constructed in America. Its (Allison) power plant is equipped with a turbo-supercharger and it is anticipated that it will produce the highest speeds ever obtained by a military plane at altitudes of twenty thousand feet or better.

The flight testing of the P-37 has just begun and it will be sometime before its official performances are definitely known even to army engineers.

These planes represent the newest equipment for Uncle Sam's air corps. They are America's bid for supremacy in the air. There are, however, only a few of them in existence. The army has no mass number of planes. . . . That is to say America's air armada does not rank any too high on the lists when it comes to number of planes. However, she has an adequate number for her defense; and the army is far more interested in developing new planes for superiority. But behind this cloak of "experimentation" is another story which people seldom consider. It is a story which should make the average citizen feel secure over his country's air defense.

While America's military aeronautics is delving into the field of new ideas, commercial aircraft concerns continue to turn out large numbers of planes for the country's growing number of amateur pilots and commercial airlines. And it is here, in the midst of America's commercial aviation, that pilots and planes are waiting for the call to arms.

It is not a long jaunt from the commercial plane of today to the military fighter. The same applies to the distance from Wright Field in Dayton to the Waco Aircraft plant in Troy, Ohio.

Here in this small mid-western town, sixteen years ago, five men started in the airplane manufacturing business in a small buggy shop. From this small beginning has grown one of the largest commercial aircraft companies in the world.

At one time devoted strictly to the manufacture of civil airplanes, the Waco Company now has a new problem on its hands —the development of fighting planes for foreign nations. The same problem is finding its way into other commercial aircraft plants throughout the nation. American planes are being built and shipped to foreign nations to be used for fighting purposes. But at the same time Uncle Sam knows that these manufacturers are constantly at his service and that the planes they turn out can easily be converted into fighters for his own use. Of course, there will be a change in the type of planes turned out should such an occasion arise, but the assembly line would continue just the same as it does today.

Under construction at the present time in the plant at Troy, Ohio, are six light attack planes which will be shipped to the Nicaraguan government for use as fighting planes for its air service. These planes might just as well be fighters (new planes like the P-37) for Uncle Sam's air force. That is the one consolation—to know that it CAN BE DONE.

It is interesting to watch the transformation which takes place as the commercial WACO is changed over into a fighter. One can easily see the changes which go into the construction.

The Waco is a bi-plane powered with a Wright Whirlwind nine-cylinder engine developing three hundred sixty-five horsepower. It has a top speed of one hundred ninety-four miles per hour and a cruising speed of one hundred sixty-six miles per hour. Its cruising range varies between three and seven hundred miles, but its maneuverability makes it an ideal pursuit ship.

As one sees the plane sitting out on the line ready for flight there is little to indicate that it can so easily and quickly be changed into a war-plane. The color design on its fuselage gives it no outward appearance of a fighting plane or even the possibility of ever becoming one, for its lines seem to take shape only as a sportsman's idea of a clean-cut plane to fly in. There are hundreds of these Wacos now in existence throughout America. Hardly any air-field is complete without its Waco plane somewhere about. But the Waco planes are far different when they begin to take shape as military fighters than they are when they are sitting on the line waiting for some joy-rider or thrill-seeker to go "barnstorming."

Probably the first change that is noticed is the military insignias on the rudder. Inside the plant one can see the planes which are to be sent to the Uraguayan government. On the rudders is a strange "Z" shaped stripe which definitely indicates an insigna like the red and white horizontal stripes on the rudders of Uncle Sam's warbirds. This is the first indication that they are *war-planes to be.*

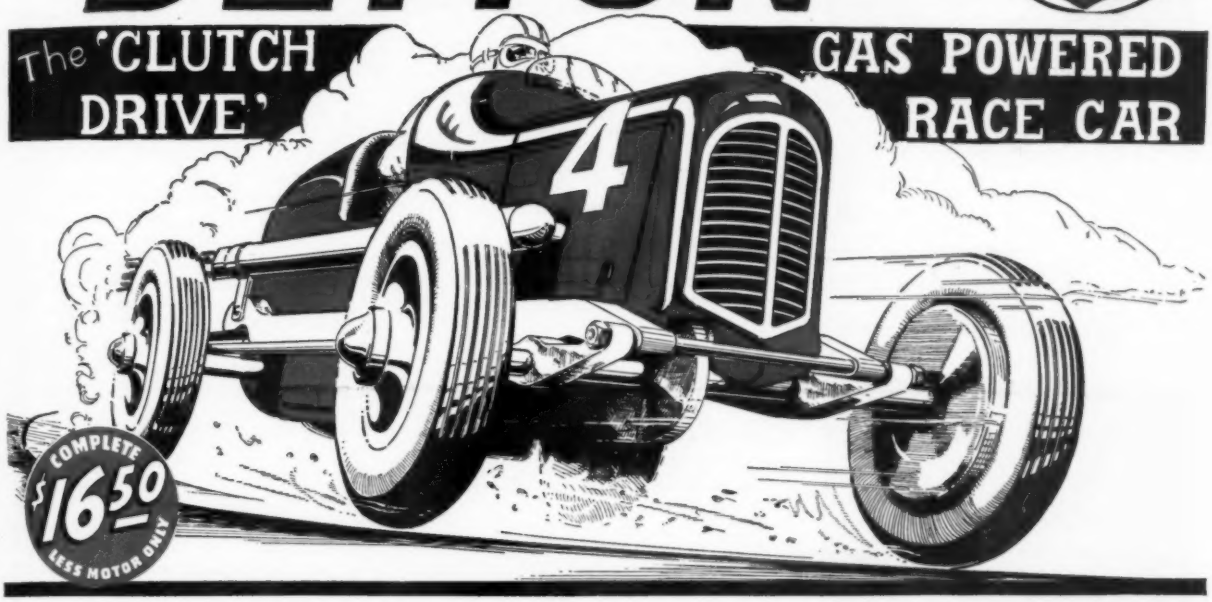
However, when one examines them closer he finds many war-like fixtures. Inside the cockpit on the instrument panel he sees markings which show the locations of the bomb release levers. Machine gun trips can be seen on the stick.

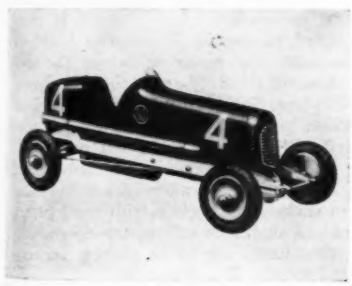
In the rear pit appears a Browning machine gun which is capable of being maneuvered into any position. These guns are capable of firing twelve hundred shots per minute.

Beneath the fuselage are five twenty-four pound demolition bombs in racks. They are controlled by handles in the front cockpit. This makes the ship ideal for attack purposes.

SPEED DEMON

The 'CLUTCH DRIVE' GAS POWERED RACE CAR





A FULLY EQUIPPED SPEED DEMON
Not an ordinary model kit, the Speed Demon kit makes up a machine composed of manufactured parts. Simply bolt together and assemble as illustrated.

PRESENTATION BY THE WORLD FAMOUS BUNCH ENGINEERING STAFF

Backed by 7 years experience in operation of models powered by small gas engines the Speed Demon is not a "guesswork" race car. It embodies the most advanced principals of automotive and structural engineering. Test models were subjected to hundreds of uncompromising, severe performance tests to merit approval of the BUNCH ENGINEERING STAFF. Conveniently operated in parking lots, street corners and tennis courts the mechanically perfect Speed Demon is a complete SUCCESS with model builders the world over.

SPECIFICATIONS: Wheel base 14¼". Tread 8". Overall 20". Weight with motor and batteries 4¼ lbs. All assemblies are built up from clutch to air cleaner. The drive shaft is fitted to bronze bearings in drive shaft housing. The front axle assembly, machined and finished, is driven through the Bunch "clutch drive" which transmits power in the most efficient and pratical manner.

The Speed Demon race car is designed expressly for the Bunch SPEEDWAY automobile engine. Similar power plants may be used, but for Championship performance, wide speed range and high speed endurance runs use the SPEEDWAY engine.

CONTENTS: Complete full sized assembly drawings are an education in the design and operation of "gas powered" race cars. Every detail of assembly and operation is shown. The finest, most suitable and fully tested materials are used.

INCLUDES: Inflatable fully pneumatic wheels ready for installation. Drilled engine mounts and shaped frame rails. Front drive and rear axle assemblies. Special air cleaner. Engine exhaust stack. Aluminum hood and shaped body and radiator blocks. All necessary screws, bolts, nuts, flat washers, lock washers, clips, wiring, ignition switch and hood fasteners.

These are the world's most complete racing automobiles and are quickly and easily assembled.

★ The Speed Demon designed to run in any size circle attached to a line, may also be run free with wheels set; or on a straight-away.

They're *fast, furious* and *fascinating;* say these enthusiastic SPEED DEMON owners. Two of these cars assembled from kits raced the next day. Send for your SPEED DEMON and be "off to the races" at any parking lot. The greatest, thrilling model sport ever developed. Get a Speed Demon kit *now*!

Bunch Model Airplane Co.,
5013 So. Hoover St.,
Los Angeles, Calif.

ORDER TODAY!

Enclosed find postal money order. Please rush me:

☐ SPEED DEMON plans ($1.00)

☐ Complete SPEED DEMON Race Car Kit

Name.....

Street.....

City.....State.....

BUNCH MODEL AIRPLANE CO.

5013 SOUTH HOOVER STREET, LOS ANGELES, CALIFORNIA, U. S. A.

British Agents: Model Supply Stores, 17 Brazennose St., Manchester

With these additions one can soon see the military plane taking shape, from the once strictly commercial Waco. There is no "joy-riding" now, this plane is out to do "business"—the business of warfare. After it has been test flighted it is crated and shipped to New York where it goes on its voyage to the foreign government.

This is but one illustration.

Large transport planes can undergo similar changes and soon be transformed into bombardment planes for use by the army. In fact two of the most popular transport plane construction companies are two of the army's biggest dealers. Boeing and Douglas airliners ply between American cities on most every important commercial airline in existence today. Boeing and Douglas both supply the army with great numbers of ships for its service.

Surely, there should be little doubt that commercial aviation offers America its—HIDDEN WINGS FOR THE ARMY.

The "Flying Scale" National Winner

(Continued from page 11)

increasing force of the wind that swept the field curtailed test flying, lending added importance to our scores. But the Caudrons gave noble account of themselves, though flown untried under capacity winds and hampered by the difficult weather conditions, John L. Ogilvie placed second in the Senior class and we won first place and the beautiful William O'Niel Trophy in the Open Class.

With this brief history we now present the plans to build this prize-winning model.

Fuselage

Join plates I and H to obtain a full size side view of the fuselage. Bend the longerons from 5/32" square hard balsa, soaking them in hot water to avoid breakage, and pin them in position on the plans. The top longerons are cut from 5/32" soft sheet balsa to simplify strengthening the body at vital points and also pinned to the drawings. Cement the uprights of 5/32" square soft balsa in place. Both sides should be built at the same time to assure their being alike. Remove the sides when dry and connect them with formers F-3 and F-4, as well as the corresponding bottom crosspieces. Pull the rear of the fuselage together and fit the necessary formers and crosspieces. The nose is joined in similar fashion, thoroughly moistening only the outside of the frame to facilitate bending the heavy structure. Note that the first three crosspieces are doubled to reenforce the nose and the landing gear struts. Check the trueness of the fuselage as the alignment of the finished model is dependent on it.

Cover the cowl with 1/16" soft sheet balsa and add the five turtle-back stringers of 1/16" x 1/8" hard balsa. The wing mounts are bent of 1/16" wire, or bicycle spokes. Cement them in position, reenforcing the fuselage sides with 1/4" copper washers. (See Wing Mount Detail sketch, Plate I.)

Landing Gear

All struts are of bamboo shaped to streamline cross section with knife and sandpaper. The true length of each strut is given on the plans. Point the ends of struts A and B and force them into the longerons, glueing the spreader bar C to their apex. The remaining struts are added as indicated by their alphabetical order. Apply at least three coats of cement to all landing gear joints. A couple of strands of 1/32" rubber are bound around the .049 piano wire axle and held on the bottom of the spreader bar by small hooks bent of pins. (See Axle Detail sketch, Plate I.) The tail skid is hinged to a tripod of 1/16" diameter bamboo struts by a bent pin and aluminum tube fitting. A small loop of 1/32" rubber is employed as a shock absorber. (See Tail Skid Detail sketch, Plate II.)

The spoke wheels are not as hard to make as it may seem. Cut the rims from laminated sheet balsa 3/16" thick and sanded to the proper cross section. Locate the hubs, using long pins to find the exact center. Insert the spokes by pointing the ends of short lengths of 1/32" diameter bamboo, and force them through the rims and into the hubs. For convenience the proper order of fitting has been indicated by numbering the spokes on the plans. Remove the rigging pins and trim the ends of any projecting spokes. Glue 1/4" copper washers to the hubs, slip the wheels on the axle and bend over the end to retain them.

Wing and Tail Group

The wing, stabilizer and rudder are shown on Plates III and IV in half size.

Shape the trailing edges to the conventional triangular section with knife and sandpaper. Mark the scallops with a compass set to the specified radius. Sandpaper the edges to reproduce the effect of tightly-stretched fabric. (See Scalloping the Trailing Edge sketch, Plate III.) Locate the ribs on the trailing edges and pin it to a soft board, raising the front about 3/32" to accommodate the under-camber of the airfoil. Cement the 1/8" thick tip and center ribs in place. Pin the leading edges against the noses of these ribs and add the remaining ribs. Be sure to make left and right panels. When dry remove the frames and insert the spar, the aluminum tube wing mount sockets and the rib stiffeners; Short lengths of aluminum tubing, through which the wing wires are to be passed, are cemented to ribs R-4, 7 and 10.

The stabilizer is flat in section, with a trailing edge made just like that of the wings, constructed entirely of 3/32" thick stock. Form the rudder pivot of .040 piano wire and cement it into a shallow recess in the under-side of the stabilizer centerpiece.

The flag-shaped rudder is also flat in section and contains a 1/16" O.D. aluminum tube to receive the pivot post.

Propeller and Covering

Carve the propeller from a medium hard block of balsa 10" x 1 5/8" x 1 3/16", laid out as shown on Plate IV. Shape the blades to an airfoil section, under-cambering the rear face about 3/32". Trim the blades to the pattern given and sandpaper the prop, using extra care around the hub. Large washers are cemented to both sides of the hub. The free wheeling device is set into the blade and anchored with at least four coats of glue. (See Garami Type Free

Piper CUB

The latest and best in construction ideas, and the most practical in size. Features new ready-shaped Leading and Trailing Edge. Scale spacing of struts and ribs in wings and fuselage. Wingspan 52¾". **$3.95** plus 20c post.

Produced by highly skilled and highly paid employees under mass production methods, Megow Model Kits offer important special features not found in other makes which sell at similar low prices. These features make it easy for any experienced model builder or amateur to turn out amazingly beautiful and accurate models, and to get much more pleasure and satisfaction from his work. This month we announce the sensational new Ready-Shaped Leading Edge, used in the new Piper Cub shown here . . . a feature which simplifies wing construction and produces much superior models.

CHAMPIONSHIP TYPES OF GAS-POWERED MODELS

QUAKER FLASH
$4.95 plus 20c post.

QUAKER FLASH. The world's champion. Easy to build. Cut-out propeller, extra hard balsa wood, spec. steel wire, sheet aluminum for cowl and all necessary supplies. Uses any model airplane motor. Wings removable and gear folds back for carrying. 3½" puncture-proof wheels. Span 67". Length 47".

CARDINAL. Designed by Maxwell Bassett, nationally-known builder and champion flier of gas models. The very latest ideas in gas model engineering and a wingspan of only 48" make it practically crackup-proof. A wonderfully complete kit, ready-to-use propeller, all metal parts die-cut, special rubber wheels. Uses any small motor with approx. ⅜" stroke and bore.

CARDINAL
$3.95 plus 20c post.

MOTOR HUM DEVICE

FREE ON ALL MEGOW FLYING MODELS, 25c AND OVER

REARWIN SPEEDSTER
$1.00 plus 15c post.

GIANT 50" FLYING MODELS

The long flights, flat glides and motor-hum of these huge, beautiful outline scale models will amaze your friends. Here you have size, light weight, strong construction, expert engineering, designs and plans accurate and simple. In addition to those shown here, there's a WACO at $2.00; a 60" STINSON at $1.50; MONOCOUPE, $1.25; FAIRCHILD RANGER, $1.00 and AERONCA, $1.00. By mail, 15c additional.

TAYLOR CUB, $1.00—plus 15c post.

TURNED NOSE COWLING

ON ALL ROUND NOSE FLYING MODELS

CESSNA C-34

NEW 30" FLYING MODELS. Models of world-famous planes, interesting in detail and design. Exceptional fliers for flight and endurance contests. STINSON RELIANT, RYAN SC, ARROW SPORT, AERONCA K, HOWARD DGA8, REARWIN SPEEDSTER, CESSNA C-34, Al Williams' GULFHAWK and others. 50c plus 10c post.

RYAN SC

MEGOW AIRCRAFT DOPE

Superior quality, brilliant, rich in color, smooth-flowing, quick-drying. Colors dense and can be thinned to about 50% and still have wonderful coverage. Fine for spraying. Same as used on big planes. Sizes from 5c up. Send for color card.

CARVED HULLS

FEATURE MEGOW MODEL SHIPS

Carved hulls are now supplied in all Megow Ship Model Kits priced at $2.00 and up. Many ready-made parts, capstans, anchors, ladders, detailed plans and all necessary materials are included in every kit.

SEND 5c for new 100-Page catalog of AIRPLANES, SHIPS, HO-GAUGE RAILROADS and illustrating scores of models, ready-made parts and supplies for all model builders' needs.

MEGOW'S

Dept. MA, Howard and Oxford Streets, Philadelphia, Pa.
or 217 N. Desplaines Street, Chicago, Ill.
or Great Western Merc. Co., 718 Mission St., San Francisco

S. Guiterman & Co., Ltd., London, Eng. Aer-O-Kits, Sheffield, Eng. A. Warnaar, Voorburg, Hol. American Products, Tienen-Tirlemont, Belg. Eskader, Stockholm, Sweden. K-Dee Pty., Ltd., Sydney, Aus.

Please send me

☐ CARDINAL	☐ WACO	☐ CESSNA C-34
☐ QUAKER FLASH	☐ AERONCA K	☐ RYAN SC
☐ REARWIN	☐ FAIRCHILD RANGER	☐ ARROW SPORT
☐ MONOCOUPE	☐ STINSON RELIANT	☐ GULFHAWK
☐ TAYLOR CUB	☐ HOWARD DGA8	☐ CATALOG

Money Order for $_____ is enclosed

Name _____

Address _____

City _____ *State* _____

Wheeling sketch, Plate IV.) Cover the prop with brown tissue, applying enough coats of dope to make the blades glisten.

The dummy motor also serves as a nose plug. A block 1 7/8" in diameter and 1 3/8" thick is used for the crankcase. A frame of 1/8" x 1/4" hard balsa fitting snugly into the nose is cemented to the rear of the crankcase. Set a short length of hard wood dowel into the front, and drill a hole for the propeller shaft through the crankcase, cementing copper washers with large bushings inserted in place as bearings.

The cylinders are composed of alternate wafers of 1/64" and 1/16" thick balsa. A fragment of razor blade soldered to a discarded compass will simplify the task of cutting them out. Assemble the cylinders on a long pin and mount them on the crankcase.

Form the prop shaft of .049 piano wire, bending the combination winding hook and free-wheeling catch first. Pass the shaft through the prop and crankcase, including a couple of washers between them, and bend the motor hook.

Covering and Assembly

The appearance of a scale model depends greatly on the covering and finish. With this in mind, sandpaper the entire framework carefully in order to remove all bumps and roughness that may spoil the job. Yellow tissue best reproduces the unpainted fabric covering of the original, especially after the model has aged awhile and the brightness of the color fades a bit. Using dope for adhesive, stick the tissue to the edges of the frames only, except on the bottom of the wings where the undercamber of the airfoil requires doping the tissue to every rib. The cowl and the inside of the cockpit are covered with brown tissue and polished with several coats of dope. Spray the surfaces lightly and apply one coat of dope to the wings and tail, though several may be put on the fuselage. Dope the bottom of the wings first and allow them to dry before doing the top. This prevents them from curving upward. Check the alignment of the surfaces frequently while drying, correcting any tendency to warp by holding the frame true.

Assembly and Flying

Mount the rudder on its pivot and anchor the leading edge to the stabilizer with a soft wire fitting to allow adjustment for flying.

The cabane of streamlined bamboo struts is set into the top longerons. A pin bent to "U" shape is cemented to the apex. (See Cabane Detail sketch, Plate I.)

Small hooks also bent of pins are attached to the landing gear strut F. (See Hook Detail sketch, Plate I.)

Slide the wings on the prongs. Tie one end of a length of grey silk thread about eight feet long to one of the small bottom hooks and thread the other end in a regulation sewing needle. Proceed to "sew up" the rigging, completing each wing panel separately. The small rubber band atop the cabane should be stretched slightly to maintain the tautness of the stays. Put a drop of cement on the apex of each group of threads to prevent snarling when the wings are removed. Do not glue the threads in their tubes as this would destroy the flexibility of the wings.

Apply several coats of dope to the dummy motor and wheels to avoid a fuzzy paint job. Use a very small brush and quick-drying colored dopes for best results. The motor has a grey crankcase with black cylinders. The wheels are aluminum up to the rim edge, with the tires black. Detail the motor with scraps of wire and aluminum tubing as shown on Plate II. Black India ink is used for the lettering and applied with a fine pen.

Ten strands of 1/4" flat, or twenty strands of 1/8" flat are needed for a good climb. The model should balance at a point about 2 1/4" from the leading edge of the wing, ballasting the back of the nose plug with clay if necessary. Check glide the ship, wedging a sliver of balsa between the top of the tail plug and the fuselage to correct stalling, or in the bottom to correct diving. Test fly by hand-launching with about 100 winds, adjusting the rudder to circle the model to the right. When a good glide has been obtained, perfect the powered flight by off-setting the thrust line with slivers of balsa between the crankcase and nose. The rubber is capable of taking 550 turns when stretched and wound with a winder, providing enough power to climb the Caudron a good height for maximum performance. Good luck!

BEG PARDON

The International Models Co. January issue advertisement listed their "Pervel Wonder Fabric" as selling at 5c for three 24x36" sheets. This was a typographical error since the correct price is 25c.

Building a Sky King

(Continued from page 21)

should be checked:

(1) The model should be balanced approximately 1/3 back of the leading edge.

(2) Check all surfaces for warps. For flying, the right wing, looking from the front, is slightly washed in so that the model will glide to the right but still climb with the torque under power.

(3) No side thrust or down thrust should be needed.

(4) A model should never be tested with a motor that is not running well. A missing motor causes constant torque changes, making correct adjustments impossible.

Upon arriving at the field make a final check of alignment. Glide the model until a long flat glide is obtained. The model should bank slightly to the right. The model is now ready for powered flight. Give the motor about 1/3 power and a fifteen second motor run. Allow the model to take off unaided from a smooth runway. If correctly adjusted more power can be given on succeeding flights until full throttle is reached. The model should then climb with a steep spiral to the left.

The whole performance of any plane can be changed by a poorly-made propeller. Some standard design propellers may be used but the utmost care should be used in shaping the airfoil. A good finish also adds to the efficiency.

In MODELCRAFT'S own building . . .

reported the finest in America . . . housing engineering department, factory and salesroom, are manufactured and stocked a complete assortment of model builder's supplies.

55 Minutes on 30 Seconds Engine Run!

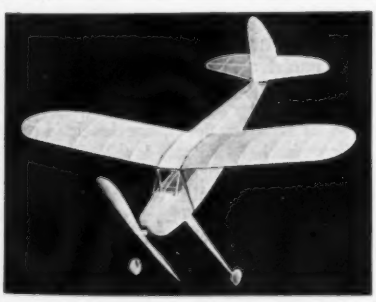
1939 PACIFIC ACE GAS MODEL

New throughout, with latest improvements in design and construction. Flying weight 3 lbs., 4 oz. Wing span 66 in., tapered from 12 to 5½ in. **Kit contains** formed landing gear, formed aluminum (Orwick) cowl, die-cut ribs, 4½" inflatable air wheels, hook-up wire, cement, dope, complete..... **$8.50**

Standard Kit with bamboo paper, ½ Pt. of dope, 1 Pt. of cement and 3½" Voit Air Wheels..... **$6.25**

Dry kit same as above without cement, dope, silk or wheels **$4.75**

Plans only ..... .50



30 in. PACIFIC ACE

A practical and durable commercial model. Easily constructed from well drawn and detailed plans. **Kit contains** an ample supply of first grade wood and high quality cement. Comparable with and out-flies most dollar kits. **Add 10c for Postage.** **25c**

REMEMBER!
$100 awarded winner of the 1939 Nationals if he is flying a Modelcraft Gas job. $25 paid the dealer selling winning Modelcraft Gas Kit.

MEET MISS TINY

Model experts stand in awe at the performance of this new Tiny sensation. A pocket edition of the Pacific Ace 46" constant cord wing. Miss Tiny has a record of 24½ minutes on a 45 second engine run. For Ohlsson 23, Phantom and other ⅝" engines. Wing span, 45". Deluxe Kit contains spun cowl, silk, 2½" Voit Air Wheels, cement, dope, die-cut ribs, plenty of good balsa, and full size plans. Price..... **$3.95**

Standard Kit same, but with bamboo paper covering **$2.95**

Dry Kit complete except for wheels, covering, cement and dope **$1.95**

Plans Only ..... .25

BRAT

Original light class motor. The Power Plant for Champions.

SPECIFICATIONS
Bore 9/16", Stroke ⅝", Bare weight 3½ ozs., Overall height 3¼" .....
.....$16.50 Post Paid

TROJAN JR.

The only motor using Roller-Bearings.

SPECIFICATIONS
Bore ⅝", Stroke ⅝", Light Weight, Overall height 3⅛"
.....$18.50 Post Paid

OHLSSON ENGINES

GOLD SEAL
For that extra margin of performance.
SPECIFICATIONS
Horsepower ½, Bore ⅝", Stroke 13/16", 500 to 10,000 r.p.m.
.....$18.50 Post Paid

MODEL "23"
Choke-full of power, speed and stamina!
SPECIFICATIONS
Horsepower 1/7, Bore ⅝", Stroke ⅝", Bare weight 4½ ozs., Height 3 9/16" .....
.....$16.50 Post Paid

BROWN MOTORS

We carry a complete stock of Brown Motors and Parts.

Model "D" $10.00 Post Paid
Model "C" $17.50 Post Paid
Model "B" $21.50 Post Paid
Model "M" $15.00 Post Paid

HI-SPEED

1/7 H.P. 6500 R. P.M. Weight bare 3½ oz. Runs upright or inverted; fully assembled, complete with coil and condenser.

$12.75 POSTPAID

MODELCRAFT

7306 SOUTH VERMONT AVENUE, LOS ANGELES, CALIF. ★ THE LEADING SUPPLY HOUSE OF THE WEST ★

A Word To the Wise

(Continued from page 9)

locked tool box or similar container to discourage the possibility of pilfering fingers among the lookers-on . . . . And a sandwich or two along with a thirst-quenching bottle of tonic are the best builder-uppers possible when contest luck looks sour . . . . Once in the outdoor battle arena, watch for favorable conditions and take flights then if possible . . . . a couple of clouds scurrying overhead between you and the sun often bring the thermals out'a hiding . . . . But don't linger too long before taking that important first flight in each event, else you'll end up behind Billiard Ball No. 8 . . . . Another request: Don't plop the models down just anywhere after flights or park 'em where good-intentioned but uninitiated spectators, Little Juniors or playful dogs can investigate just how strong the covering is! . . . . If the day is warm keep the rudder out'a the sun, and this means out of the heat-holding fuselages when not in use . . . . On-the-other-hand: If you're flying at an indoor brawl in an unheated cowshed some people call an armory, keep rubber motors warm by carrying 'em in an inside pocket . . . . In case of a misunderstanding: Don't argue overly long with a timer if he doesn't see your side of a controversy such as your claiming the watch must have stopped . . . . take such matters up calmly with the contest director . . . . And give your timers some credit for being human . . . . undoubtedly, they figure they're just as right as you think you are . . . . Humor 'em, josh 'em and if perhaps they're sedate business men, don't call them by their first names! . . . . That's just a commonsense rule of courtesy and Mr. Whoosis and all his assistants will love ya if you abide by it . . . . And then, too, don't rush contest officials . . . . Wait till you run your first meet . . . . What a headache . . . . But we bet you'll like it just as much as we did!

They Call It Down Thrust

(Continued from page 15)

acteristics have been changed in a manner which would create any change in the aerodynamic force set-up. The "down thrust" in each model is different. It is obvious therefore that the value of the "down thrust" can never be a measure of its aerodynamic effect when it is calculated on this basis.

We do not mean to infer that there is no such thing as the condition now termed "down thrust," but we merely say it is obviously misnamed. To give further credence to this we will now turn the machine clockwise about the center of gravity so that the thrust line is horizontal, Figure III. The plane in all respects is the same as the one shown in Figures I and II. However, in its new position it is shown in Figure III. The true aspect of the situation now begins to dawn upon us. With a little thought one comes to the unavoidable conclusion that the flight path is parallel to the thrust line when the plane is flying at its normal minimum level flight speed. In this position, which is the actual position of the plane in flight as described above, there is no "down thrust." In other words, no "down thrust" relative to the line of flight. Thus we have proved that actually in relation to aero-dynamic factors there is no such thing as "down thrust." Calculation of "down thrust" relative to some arbitrary construction line is merely misleading and complicates a simple problem.

Now let us see what we have in respect to the aerodynamic set-up of the model shown in Figure III. The thrust line being zero, the wing angle of incidence is + 6°. The angle of the stabilizer is + 4°. By this system, you can see that we are able to determine the characteristics of the essential factors of the plane by merely considering three of these factors. Why then is it necessary to create a fourth one; the arbitrary base line? Some model builders may say at this juncture, "Well, the fuselage is not horizontal." Of course it is not, but this is unimportant as it does not enter any of our aerodynamic balance calculations, generally speaking. The only way that it affects the plane in flight is through its parasite resistance. In assuming the design of a model on the basis of "down thrust," as taken in our first example, the model builder visualizes the fuselage of his model as passing through the air in a horizontal position. This is incorrect; for, as shown in Figure III, when such a model is flying level, the fuselage passes through the air "tail-low." Actually in the climb the fuselage of such a ship, in most cases, would be passing straight through the air. Thus, although the design of the model is based on a misconception, the practical results are exactly what one would desire but does not know that he is getting.

Every model should be designed so that it gives its lowest resistance when climbing. When designing your next model try out this system which has been just explained, assuming that the thrust line is horizontal and that there is no "down thrust." Then assign the proper angle to the wing angle of incidence and stabilizer

angle. The value of each one of these will be an accurate measure of the effect each one will have upon the performance of the ship. An excellent set-up for a model which climbs efficiently is a wing angle of incidence measured from the thrust line of 5°, a stabilizer angle of + 2½°. This arrangement will allow the model to climb at the angle of incidence assumed, at which angle usually the greatest lift-drag ratio occurs. As most model builders know, the lift-drag ratio is the measure of flight efficiency and the greater it is, the more the climb will be.

In this set-up we have an added advantage of a positive stabilizer. Under these conditions the stabilizer actually carries part of the load, supplementing the lift of the wing. In effect such a model is a tandem tractor monoplane. From the moment the use of this arrangement began the breaking flight records started universally. Before the advent of the lifting stabilizer, models were designed with stabilizers either parallel to the line of thrust or negative to it. Some models even incorporated negative cambered stabilizers, such as the old indoor type of model that many may remember. These old types, because of the stabilizer arrangement, actually carried a down load or, in other words, generated negative pressure. This pressure had to be carried by the wing; though the wing not only supported the weight of the model but also the weight of the air pressure acting on the stabilizer. If the weight of the model was two ounces and the air pressure one-half ounce, the wing supported a weight of two and one-half ounces. Therefore, instead of calling this arrangement "down thrust" let us name it correctly as "POSITIVE STABILIZER."

Another benefit derived from such an arrangement is its effect on the glide. Normally when the stabilizer is horizontal and parallel to the thrust line, the center of gravity should be located approximately one-third of the chord length back of the leading edge of the wing for proper flight balance. However, when the stabilizer is given a positive angle relative to the thrust line it generates lift. Thus, in order to prevent the model from nosing over and to insure correct poise in flight, the center of gravity must be moved to a position which is closer to the rear of the plane. If the stabilizer has an angle of incidence of about 1°, the center of gravity must be from 50 to 55% of the chord length to the rear of the leading edge of the wing. Many times the center of gravity is at the trailing edge of the wing. In such cases the stabilizer angle should be approximately 2½ to 3° positive, relative to the thrust line. This of course is based on the assumption that the wing angle of incidence is from one to two degrees GREATER than the stabilizer angle.

When this arrangement exists the weight of the airplane, acting at the center of gravity, actually is carried partly by the wing and partly by the stabilizer.

Now let us see what effect that has on the airplane when it is gliding. Whereas the stabilizer is acting at a positive angle when the model is under power, it is actually acting at a zero angle when gliding. Thus we have a condition where the stabilizer does not normally lift in the glide and in which we have the center of gravity back of the normal center of lift of the wing. If you will visualize this or draw a sketch of this you cannot but see that the model will have a tendency to nose upward due to the pull of the center of gravity to the rear of the center of lift. This condition prevents the model from diving in or gliding at high speed. It creates a floating tendency which enables the ship to gain advantage from the slightest thermal.

Perhaps the numerous advantages to positive stabilizer may be more fully realized if we call your attention to certain factors. In Figure II you will see that by dipping the thrust line, or as in Figure III, lowering the rear end of the fuselage so that the thrust line is horizontal, the thrust line is above the center of gravity. If the position of the thrust line was coincident with the base line it would be below the center of gravity. In Figure I you will see that the center of lateral area, marked CLA, is considerably above the center of gravity. This is a very bad condition when the thrust line is not negative to the base line, and will cause spiral diving under speed. In Figure III we see that by placing the thrust line in the position shown (what some call "negative thrust") the CLA is on a horizontal line with the center of gravity.

Thus we have produced a situation which will insure stability by giving the model so-called "negative thrust." Briefly if the thrust line is above the center of gravity there will be less tendency for the model to stall. If the CLA is on a horizontal line with the center of gravity, or very slightly above it, the model will be spirally stable. It is evident therefore that if a model has these unpleasant characteristics they may be corrected merely by dipping the line of thrust. This is one of the reasons why it is apparently a "cure-all" for difficulties resulting from primary design deficiencies. In other words, to insure correct design, provided the design is incorrect in the first place, merely dip the thrust line.

COMPLETE KIT

$5.

ASSEMBLED $10

REAL ENGINE VALUE—$5

Here is your opportunity to buy a kit of the famous G.H.Q. Gasoline Motor. ABSOLUTELY COMPLETE—ALL MACHINING DONE—READY TO ASSEMBLE. All you need is a screwdriver. BUILD YOUR OWN ENGINE AND SAVE!!

AN ENGINEERING TRIUMPH . . .

Never Before at So Low a Price!!

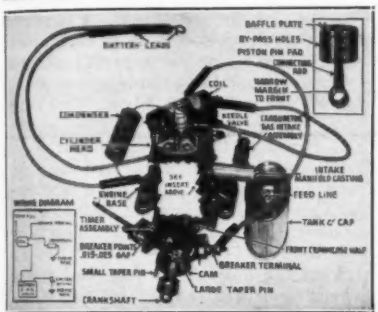
Indeed an engineering triumph—accomplished by outstanding G.H.Q. designers and engineers, who have constructed into the G.H.Q. motor everything that years of exhaustive scientific aerodynamic research could produce—geared to the highest possible degree of perfection. But more than that, the acid test . . . an overwhelming response. Thousands of users in all parts of the country are praising, recommending, and endorsing this scientific achievement. It seems as if everyone in America wants one. The most hair-raising thrill you've ever experienced will be yours with the G.H.Q. motor—actually one of the most powerful motors ever constructed. Has broken records for amazing performance . . . and just imagine—flies model planes up to 10 foot wingspread. AND JUST AS EFFICIENT FOR BOATS AND STATIONARY USE. Easy to start and simple as ABC to assemble.

Everything is in the kit including Champion spark plug, Winston coil, condenser, tank and cap, ignition wire, cylinder, piston, connecting rod, timer, crankshaft, all screws, nuts, bolts, complete instructions, etc. Every part is fully machined and finished. No oil, gas, batteries, or propeller included. A SCREWDRIVER IS THE ONLY TOOL YOU NEED.

EXACTLY THE SAME PARTS THAT GO INTO THE G.H.Q. ASSEMBLED ENGINE

ALL PARTS GUARANTEED

Average Assembly Time 30 Minutes



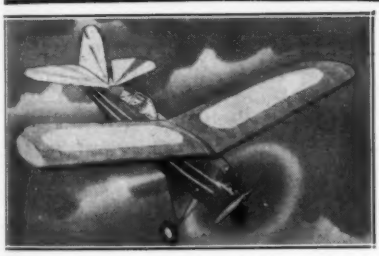
THE ONLY ENGINE WITH A WARRANTY—APPLIES TO BOTH ASSEMBLED ENGINES AND KITS

Over 7000 of these same famous G.H.Q. Gasoline Engines have been sold at $8.50. Mass production methods and enthusiastic reception have enabled us to reduce the price from $35 originally TO THE NEW LOW PRICE OF $5.00.

The new 1939 model now for sale includes the new unbreakable steel stamped piston giving high and perfect compression. Free Sportster Gas Model Plans.

SPECIFICATIONS

4 Port 2 Stroke Cycle. ¾" Stroke. 15/16" Bore. 300-7,000 R.P.M. Turns 14" Prop. 8" Pitch. Bearing Surface, 1¼" Long. Crankshaft, 5/16" Diam. Weight, 10 oz. (Motor) Rotation, Either Direction. Height, 4½"—Width, 2½" H.P. Approx. 1/5th.



G.H.Q. SPORTSTER GAS MODEL KIT

The G.H.Q. Sportster Kit was especially designed for the G.H.Q. Gasoline Motor but may be used for any other motor of like weight and power. Built according to scientific aero-dynamic principles.—Has made hundreds of successful flights without crack-up.—Marvelous glider . . . And what a climber! 4-hour flights are common!

A 6-foot 4-inch model that is built for many hours of successful flying. It can be taken apart and assembled very easily, is rugged enough for every day flying, but is light enough for contest flights. Its soaring qualities are amazing, its movable wing makes flight adjustments easy, even for the beginner. Shock absorbing landing gear insures a smooth, easy landing at the end of each flight. It is built to fly in practically any weather, and has flown consistently from four to five minutes on 3/16 of an ounce of fuel. A rugged motor mount that makes it easily accessible is a feature of the kit. The kit contains MORE than enough material to allow for mistakes and any possible crack-ups. This kit is complete with inspected Spruce, High Grade Balsa Wood, Special Cement, Bamboo Tissue, Finished Wheels, Special Spring Wires, Dural Angle and Rectangle, Dope, Tubing, Dowel, Etc., and a set of easily understood plans. All packed in a durable case. The kit is so complete that a beginner can build a perfect job by following our plans.

COMPLETE KIT ONLY **$5.**

G. H. Q. PROPELLER

Made of Aluminum Alloy—weighs 3 oz.—will outlast many wooden props.

A prop especially designed for the G. H. Q. engine; makes starting easy; correct weight and pitch—14" long, 8" pitch.

Only $1.65 p.p.

G. H. Q. FLYWHEEL

For Boat and Stationary Use

For Quick Starting Weight 3/4 lb.—Diam. 3 in. Properly Designed for Use with the G.H.Q. Gas Engine Only $1.65 p.p.

SPARK PLUG WRENCH

50c p.p. Gives Tight Fit

Lasts A Lifetime Aids Compression

Will Save Its Cost Many Times Over In Spark Plugs Saved

G. H. Q. MIDGET SWITCH

A Light and Convenient Ignition Control

Saves Coil, Condenser and Batteries

Worth Having

Only 35c p.p.

NEW ILLUSTRATED 6-PAGE CIRCULAR!! Send 3c Coin or Stamps

DEALERS! Share in the demand for G. H. Q. Engines. Write in for discount schedule and sales helps

HOW TO ORDER: Send Only $1.00

We ship Express Collect C.O.D. for balance.

For shipments outside U.S. and Canada send full amount plus $1.00 for packing, postage and insurance.

G. H. Q. MOTORS, Inc.

MANUFACTURERS OF

Miniature Gasoline Engines and Model Airplanes

854M EAST 149th STREET NEW YORK, N.Y.

ORDER TODAY—24 HOUR SERVICE

G. H. Q.'s FIFTH YEAR!

Thousands of Satisfied Users! Read some of these testimonials on file with us:

J. B., Providence, R.I.—"A few weeks ago I received the G.H.Q. motor kit and it is running perfectly. I hope to write you soon and tell you about some excellent flights."

R. H., Prairie du Chien, Wis.—"Your motors sure can take a lot of abuse and knocking around and yet perform perfectly. I have had two in a period of about two years and have seen higher priced motors give less service and performance."

W. W. M., Russellville, Ark.—"I received my G.H.Q. Motor Kit and am very well pleased. I had motor together in 1 hr. 40 min. I will place order next week for G.H.Q. Sportster Kit."

W. L., Claysburg, Penn.—"A wonderful motor that thrills any air-minded person. Strong and neat looking. As good as motors costing twice as much."

A. K., Hillside, N.J.—"I still can't understand how you can put such a dependable and rugged engine on the market at such a low price."

E. T., Sayville, N.Y.—"Received my G.H.Q. Kit okay and am more than delighted with same. You've got 'em all beat for price and performance."

R. P., Hamburg, N.Y.—"I want to extend my personal thanks to G.H.Q. for their prompt service. The motor I ordered was received within 24 hours. Such service cannot be surpassed. I also want to say that I have the motor running perfectly. I shall do all I can to help promote the success of G.H.Q."

H. H., Midlothian, Ill.—"Motor assembled correctly and performs perfectly. I am fully satisfied."

L. N., So. Euclid, Ohio—"Received my finished motor. I am very pleased with it and runs fine. I will be glad to encourage others to get G.H.Q. motors."

C. C., Chicago, Ill.—"I received my motor and I am quite satisfied and surprised at the precision parts for the money."

E. E. F., Mare Island Navy Yd., Calif.—"I saw your offer of a complete G.H.Q. Gas Engine Kit for only $5 in the August issue of Mechanix Illustrated. I have just cracked up the G.H.Q. that I bought this spring. It had over 50 hours on it, and I have had very little trouble with it, and made my own repairs whenever the engine needed them. As I was glancing thru the magazine, the ad struck my eye. At that price I will be able to pursue my favorite hobby again, gas power models."

THE G. H. Q. GAS ENGINE CAN BE USED IN BOATS AND PLANES WITHOUT ANY CHANGES

The G.H.Q. Gas Engine sold four years ago for $35. Today, you can secure a vastly improved engine kit for only $5. How is this possible? Simply because we have invested thousands of dollars in tools, jigs, dies and equipment to produce the only mass-production motor in the market. All parts are uniformly perfect.

1938 SALES OF G. H. Q. ENGINES ARE AT THE RATE OF 10,000 A YEAR

The effectiveness of positive stabilizer ("down thrust") was recognized by Mr. Charles H. Grant as early as 1919. At that time this arrangement was incorporated in several designs of planes. These were sold in large quantities throughout the country. It became the common knowledge of model builders when a twin tractor incorporating this factor flew away from twin pushers. The latter weighed only one-half as much as the tractor model. This occurred in 1930 at the New England Championships at Springfield, Mass. Many of the contestants could not understand the reason for the heavy wooden wheels which graced the nose of the plane. This ship having no tail load, but instead a lifting stabilizer, was able to carry the extra weight of the wheels at the nose because of the added lift. Because of this arrangement the center of gravity was located well forward thus allowing a moment arm between the wing and the tail which would insure stability.

If by any chance you have not built planes with various degrees of *"positive stabilizer"* do not fail to incorporate this feature in your next model. The average flight of your planes should be nearly double if this feature is used.

NOTE: For further information concerning the action of "positive stabilizer" and other forces that create stability, see the articles by Mr. Chas. H. Grant in the June, July and August 1933 issues of the MODEL AIRPLANE NEWS.

Canadian Model Matters

(Continued from page 7)

to effect a potential increase in duration. Accuracy to scale and workmanship shall be considered along with duration, the judges having the right to rule ineligible any model which in their opinion does not sufficiently resemble some man-carrying machine. A full-size plan, which must have been published or commercially printed either in full or part scale, shall accompany each entry. Aerofoils shall be single or double surfaced according to the practice followed in the real aeroplane represented. Covering material must be opaque. Models shall be of the R.O.G. type."

The present tendency among the flying semi-scalers is to use colored microfilm which is opaque or nearly so. Flights up to six and seven minutes with these "indoor commercials" have been recorded. While a builder may accurately adhere to the scale outlines of his "commercially printed" plan, the question is wether the plan itself has deviated from scale. Most of this is considered and compensated for in the judging where out of a possible maximum of 100 points for scale, the highest ever obtained has been 85. The points for scale and workmanship are coupled with the flying time to give the final results. Plans for a winning flying semi-scale model, flown by Bruno Marchi at the Canadian Nationals, appear on page 26.

1938 Canadian Championship Meet

This annual competition sponsored by the Canadian National Exhibition was held on August 29th, 30th and 31st in Toronto. On Monday, August 29th, qualifying rounds were flown in the Coliseum at the Fair Grounds. Since it was Children's Day, thousands of youngsters cheered the indoor flights. Each contestant was required to fly in each indoor event which he or she expected to enter.

On August 30th the outdoor events were run off at the Toronto Flying Club's private field several miles outside the city. Ted Booth of the M.A.L.C. directed the battle which saw entrants from Michigan, New York City, Massachusetts and most of Canada, including a Saskatchewan modeler who traveled 2,000 miles to attend the meet!

After the dust of the fray had settled, winners emerged as:

Gasoline Engine Powered: 30-second motor run:

1. J. B. Kennedy, Toronto, Ont..... 4:02
2. Ray Hunter, Weston, Ont..... 3:10
3. Jim Jensen, Unity, Sask..... 3:08
4. Douglas Ireland, Edmonton Alta. 2:59
5. Robert E. Milligan, Toronto, Ont. 1:52

Gasoline Engine Powered. Limited fuel allowance—1/16-oz. per pound:

1. Robert Wolfston, Detroit, Mich... 8.51
2. Douglas Ireland, Edmonton, Alta. 8:30
3. Robert E. Milligan, Toronto, Ont. 3:57
4. Clifford E. O'Reilly, Toronto, Ont. 3.37
5. Albert M. Pow, Toronto, Ont..... 3:10

Wakefield Models:

1. Lavalle Walters, Windsor, Ont... 2:21
2. Edward Romiens, Windsor, Ont. 2:16
3. Robert E. Milligan, Toronto, Ont. 2:09
4. Roy Nelder, Toronto, Ont..... 1:54
5. Clyde Lockhart, Toronto, Ont..... 1:50
6. Melvin Walsh, Toronto, Ont..... 1:14
7. Renee Milligan, Toronto, Ont..... 1:05
8. Fred Bower, Toronto, Ont..... 1:04
9. Douglas Ireland, Edmonton, Alta. 1:02
10. John Lemick, Humber Bay, Ont. 1:00

Outdoor Stick Models: Contestants under 16:

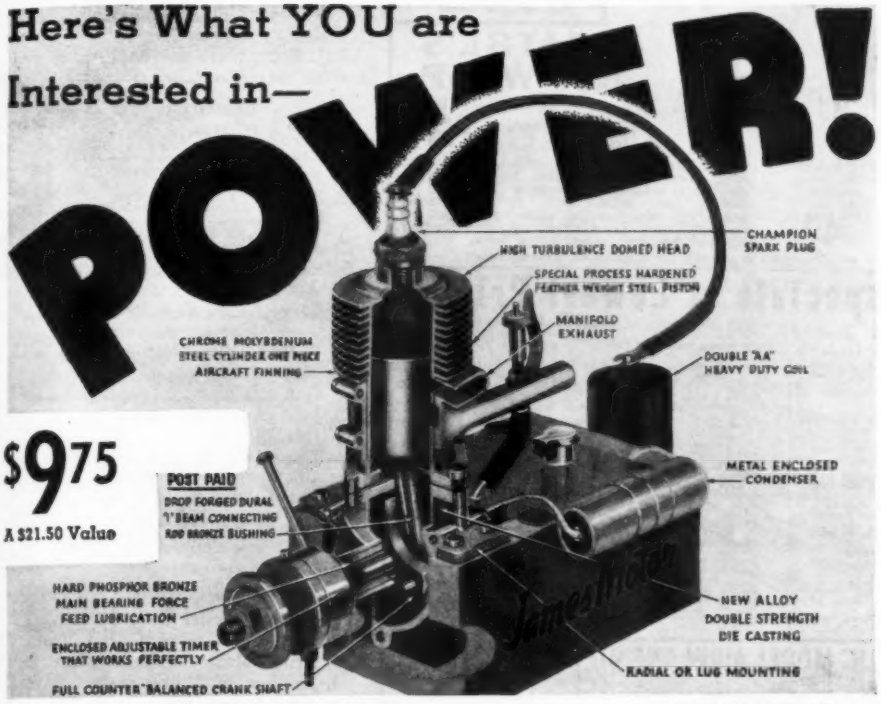
1. Harry Lucas, Toronto, Ont..... 7:24
2. Albert Meschino, Toronto, Ont... 3:56
3. Joseph Meschino, Toronto, Ont. 3:42
4. Terry Algeo, Winnipeg, Man..... 3:00
5. Kenneth Thomson, Toronto, Ont. 2:49

WE GUARANTEE YOU THE FINEST MOTOR

Regardless of Price

Here's What YOU are Interested in—

POWER!



$9.75
A $21.50 Value

The New 1939 JAMES MOTOR is a PRECISION BUILT HIGH SPEED HAND LAPPED JOB

•

This Quality Motor (Actual Value $21.50) Tested and Guaranteed

•

DIRECT Factory to You Price Only

$9.75 Postpaid in U.S.A.

SPECIFICATIONS

Displacement, 11.32 c. c.—15/16 Bore—15/16 Stroke—4 Port—2 Cycle—1/4 Horsepower—Weight Bare 8 oz.

WE HAVE NO DEALERS
Buy direct and spend the difference.

No. 1 Special James Combination

James Motor, value	$21.50
Blue Star Gas Kit Dry, value	5.00
Hi-Rev. Precision 13" Prop., value	1.50
Total Value	$28.00

Your Price ALL 3... **$12.85** Postpaid

No. 2 Blue Star Gas Model Plane

THIS PLANE IS A CONTEST WINNER and is perfectly balanced, precision built, and can be assembled by anyone very quickly. It comes with all parts accurately cut, including silk and hardware. The plans and specifications in this kit are full size. It has a 5-foot wing span. The regular price is $5.00.

Your Price **$3.65**

No. 3 De Luxe Combination

James Motor, Value	$21.50
Blue Star Gas Kit Dry, Value	5.00
Balloon Tire Wheels 3½", Value	1.50
Accurate Light Weight Flight Timer	1.50
Hi-Rev. Precision 13" Prop., Value	1.50
Total Value	$31.00

Your Price Complete..... $13.85 Post-paid

"Boy! What a deal."

FLASH! James Motor Wins First Prize in Low Wing Event Gas Model Airplane Association of Southern California Contest December 11, 1938.

James Motor

THE GREAT WESTERN AIRPLANE COMPANY, INC.
1700 W. ADAMS, LOS ANGELES, CALIF.

Outdoor Stick Models: Contestants 16 and and over:

1. Roy Nelder, Toronto, Ont..... 9:12
2. John T. Dilly, Galt, Ont..... 4:21
3. Jim Jensen, Unity, Sask..... 3.42
4. Steve French, Toronto, Ont..... 3:11
5. Ernest Barrie, Galt, Ont..... 3:09
6. Bruno Marchi, Boston, Mass..... 3:08
7. Barbara Maschin, Westfield, Mass. 2:48
8. Robert E. Milligan, Toronto, Ont. 2:42
9. Charles N. Baker, St. Catharines, Ont. 2:36
10. Charles Petrevanin, Kirkland Lake, Ont..... 2:35

The following day, the 31st, the indoor meet was held in the Fort York Armouries, just opposite the main entrance to the Exhibition. Although the building has only 50 feet of effective flying height, because of its geodetic-construction roof and ample floor space, it is an excellent indoor flying arena. Indoor times were as follows:

Indoor Flying Semi-Scale: Contestants under 16:

	Time	Points
1. Terry Algeo, Winnipeg, Man.	2:14	199
2. Harry Lucas, Toronto, Ont.	2:05	190
3. Gordon Resnick, Toronto, Ont.	1:27	151
4. Jack Leydon, Halifax, N. S.	:56	121

Contestants 16 to 21

1. Jim Templeton, Toronto, Ont.	4:13	331
2. Albert Cominsky, Toronto, Ont.	2:31	299
3. Kenneth A. Walkerdine, Toronto, Ont.	2.07	199
4. Charles Baker, St. Catharines, Ont.	1:51	183
5. Warren Hall, Toronto, Ont.	1:58	178
6. J. Roy Currie, Halifax, N. S.	1:29	156

Contestants over 21

1. Bruno P. Marchi, Boston, Mass.	3:41	297
2. John T. Dilly, Galt, Ont.	3:41	289
3. Harold Frier, Toronto, Ont.	2:14	199
4. Jim Jensen, Unity, Sask.	:36	105

Indoor Stick Models: Contestants under 16:

1. Terry Algeo, Winnipeg, Man..... 6:11

Contestants over 16

1. Wilbur Tyler, Boston, Mass..... 15:26
2. Thomas G. Harris, Toronto, Ont. 13:02
3. John Meyer, Elgin Mills, Ont..... 10:35
4. John T. Dilly, Galt, Ont..... 10:06
5. Donald McIntyre, Guelph, Ont..... 9:04
6. Jim Templeton, Toronto, Ont..... 8:50
7. Charles Baker, St. Catharines, Ont. 8:41
8. Robert E. Milligan, Toronto, Ont. 8:09

Indoor Fuselage Models:

1. Ernest Barrie, Galt, Ont..... 7:57
2. Donald McIntyre, Guelph, Ont... 6:39
3. Bruno Marchi, Boston, Mass..... 6:07
4. Jim Jensen, Unity, Sask..... 3:40
5. John Meyer, Elgin Mills, Ont..... 1:05

At the banquet tendered the contestants the same evening the various class champions were announced as: Junior Champion—Harry Lucas. Senior Champion—Robert E. Milligan. Adult Champion—Jim Jensen. And the fellow who traveled 2,000 miles to attend the meet, Jim Jansen of Saskatchewan, was declared Grand Champion and awarded the 47-hour flying course leading to a private pilot's license.

Snatches of the three-day meet: Fred Rogerson with his biplane Wakefield model which was unfortunately put out of the competition by gear trouble. . . John Dilly just out of the hospital after tangling with a couple of high-speed metal-stamping machines—more cheerful than ever. . . "Jeff" Harris quietly preparing his models for competition—we learned he had been building indoor models only six months when he beat Carl Goldberg and all the lads at the 1937 American Nationals. . . Jim Haffey at the banquet—he was a Jr. Birdman indoor champ. . . Frank Lucas, a Canadian version (and a slightly slimmer one) of America's promoter-leader-merchant Irwin S. Polk—and just as busy. . . Stupendous was the word for the Exhibition known to Torontonians simply as "The Ex". . . Roy Nelder, the Moffett winner, who does not build indoor jobs. . . Renee Milligan of Toronto and Barbara Maschin of Springfield, Mass., lending feminine pulchritude to the fracas as well as beating some of the better builders entered in the contest. . . and the challenge trophies which were "so-o-o-o-o-o- high", but which must be returned next year (if they find ya!).

"Gas Lines"

(Continued from page 25)

to the gas variety they are no longer in a class which is beneath their dignity to notice. Model leaders for many years have been striving to create the realization among those interested in aviation that model planes are the most important instrument that can be used in the aeronautical education of young men. We note with great joy that adults are beginning to realize this also.

Believe it or not, picture No. 5 gives proof that a model builder has mounted a three cylinder Forster in a modified Super-Buccaneer. The Forster Brothers motor develops about 1/3 horsepower; and on this basis this little motor will develop one full horsepower. This should act as a jolt to the imagination of all gas model builders. Mr. Walter Tinsley of 520 Wisconsin Avenue, Oak Park, Illinois, is responsible for this brave attempt. As yet he has not flown the ship. He says he wishes to get his ship "upstairs" in record time on the thirty-second motor run, so he has gone the limit in using as much power as the ship will stand.

We are sure our readers will be interested to know what results from this experiment. We venture to say that one of two things will happen—either the ship will climb vertically or else it will be torn apart by the power of the motor. This motor, equipped with the properly designed propeller, will deliver a static thrust of about ten to twelve pounds.

Few gas model builders have attempted metal construction. However here, in picture No. 6, we have an example of the work of a pioneer in this field. The ship was constructed by Thomas J. Clyburn of 188 South Portage Path, Akron, Ohio. It has a spread of 11-1/2 feet and, believe it or not, with a Brown Junior engine it weighs only 5-1/4 pounds. Clyburn says that the covering should add about half a pound more. Mr. Clyburn has the distinction of working on the construction of both the Akron and Macon airships, and at present he is with the Goodrich Company. He is now looking for a spare motor with which to power the ship, as his old motor has failed to function properly. If anyone in his vicinity will extend him the use of a motor it would be greatly appreciated.

Picture No. 7 shows Mr. John K. Northrop, builder of the Northrop planes, inspecting a forty-two inch Warrior gas model, equipped with Marpell streamlined wheels. Mr. Northrop says:

"I was very much surprised to learn how specialized the problems are that confront the gas model builder and manufacturers. Today the youth of America can learn much in regard to aircraft design and flight characteristics by building and flying gas models. And what is more important, successful gas model construction develops a thoroughness of method and a type of craftsmanship that is invaluable to the young men with thoughts of entering the construction field in the aircraft industry."

One fine day during the past fall, a little "Robin" was flying south to join his comrades in warmer climes. Apparently this little bird became weary and attempted to find some suitable spot to rest his wings;

for here we see it perched in a tree in a rather ungainly fashion. Evidently he was so tired that he misjudged his landing, as you will see in picture No. 8. Its owner, Kenneth Rose of 786 Water Street, Peterborough, Ontario, Canada, finally rescued it. He tells us that it is again in good shape and ready to resume its wanderings through the sky.

Aside from levity, Rose tells us that this Curtiss Robin was the first model he built; as well as the first in his community. Although it has had its share of crashes, he has been flying it steadily for about two years. Now there are about ten gas models in Peterborough.

Picture No. 9 shows John Clemens of Indianapolis, Indiana, with his rubber-designed fifty-four inch Comet Aeronca K, which he has powered with a Chunn gas motor. This, we might say, is the "missing link" between rubber and gas models. Mr. Clemens has accomplished something which model builders have been attempting to do for years; namely, construct small, light models powered with a miniature gas engine. This is one of the smallest and lightest jobs ever flown with this type of power.

Picture No. 10 shows how miniature gas engines allow a model builder to follow full scale lines closely. It shows a Douglass 046-A of five foot wing span which was built by Byron Jenkins of 5327 North 27th Street, Omaha, Nebraska. It is powered with a Mighty Midget engine and weighs four pounds.

Peter Bowers of Los Altos, Calif., makes a very interesting contribution to these columns. It is picture No. 11, which shows his gas powered amphibian. We will let him tell you about it in his own words:

"In the May issue you stated in 'Gas Lines' that we Americans do not go in greatly for hydros. Perhaps we don't, but I have built a little amphibian in which you may be interested.

"It is practically all balsa, only the motor mount and struts being made of pine. The rest of the structure is practically all sheet balsa, strip wood being used only to connect the two sides of the hull. The entire ship is silked. The wing spars are two triangular box spars; one forming the leading, and one the trailing edge. The tail surfaces are built in the same way. The ship was built to take a beating, and can certainly 'take it.'

"One day the coil came loose in the air, and the ship dived full power into the lake, damaging only the pilot's cabin. It came in from nearly three hundred feet. The ship has been ducked several times due to wind and rough water, but is none the worse for it. The first thing I do after fishing it out is to start the motor. If it was running when it went under, I have to take the cylinder off to get the water out of the crankcase, but otherwise it starts right up.

"The ship has a span of fifty inches, a length of thirty-six, and weighs twenty ounces. The motor is a Brat. At first, this may seem to be a big ship for such a small engine, but I use a Gottingen 490 wing, which has an L/D of 22. The ship gets off the water in fine style. Because of the very high line of thrust, the climb is fairly slow, as the high pull of the motor has the effect of pulling the C.G. forward when under power. When the engine cuts, though, the ship goes into one of the flattest glides that I have ever seen on any model, gas or otherwise. In spite of its freakishness, the plane would be a fine contest model, if only it had a faster climb.

"The landing gear is retractable, the struts unhooking at the wheel, and rotating upward through 180 degrees, where they hook again in the 'up' position. They are manually operated.

"The motor mount is fixed rigidly to the wing, which is in turn held to the fuselage by rubber bands. There is no need to fool with the wiring when removing the wing, as all the wires are connected from the hull to the wing by contact plates.

"I came in for a lot of criticism about this feature (motor mount on wing) while I was building the ship. Everyone said that the motor should be rigidly mounted to the hull, but in the long run, this method has proven to be the best. In this way, the rubbers holding the wing act as shock absorbers for the motor in the event of a head-on bump. When the ship stops, that high motor tends to keep on going in the same direction, and exerts quite a bit of pull in doing it. Mounted the way it is, it can be stopped without a hard jolt by the rubber at the rear of the wing as it pivots on the front spar. If it were rigid, something would be sure to carry away.

"The flight characteristics of the ship are much better than I had dared hope they would be. Probably, I suppose, of the high C.G. and the low C. of L.A., and the high thrust line. Even with the little bit of dihedral that it has, much less than other ships of the same power and size, it fooled everyone, even me, at its test-hops. We all expected a spin if it got turning too much.

"I call the ship 'The Duck,' and have Donald Ducks, cut from the funnypapers, on either side of the nose."

Members of the Sky Devils Club of Oakland, Calif., have tried something new. Recently they held a contest at night. Why?—we don't know; but at least it is interesting. Picture No. 12 is not a ghost ship, but shows George Nelidov's model, which took second place, in the glare of the floodlights. Nelidov lives at 1691 Ward Street, Berkeley, Calif. We thought that gas model fliers had enough trouble flying planes in the daytime, without adding the hazard of darkness. Brave, that's what we call 'em.

Here's another scale gas model. It is a Westland Lysander, designed by B. Clerico and built by "Skeeter" Palmer of Rochester, New York. It has a span of forty-four inches and is powered with a Brat 1/10 horsepower engine. It has excellent flying qualities in spite of the fact that it is slightly under-powered. The ship weighs only two pounds. Palmer tells us he has been building gas jobs for the last eight years. This places his activities in this field before the first appearance of Bassett's gas powered ship at Atlantic City during the National Contest of 1932. We should like to hear more about Palmer's early experiments.

In our November "Gas Lines" we printed an account of the adventures of a model plane, belonging to Ted Long, over Somerville, New Jersey. The information was obtained from the *New York Herald-Tribune;* and now Long gives us his side of the story. He says:

"The story must have been rehashed many times before it reached print. The plane, a Super-Buccaneer, had a wing spread of 7-1/2 feet. The motor, a Brown, had only one cylinder, not two, and had an ounce and a half of fuel.

"The model didn't spread consternation because those who chased the plane asked several people if they had seen it. No one had; the shoppers and motorists found out about it several days later in the paper. The plane missed buildings and church steeples by a thousand feet, straight up; neither did the wing twist the rudder.

"It's held on by several bolts and a steel centerpost. The cause of the trouble was a switch around the timer used when running the motor on the ground. This switch was left closed accidentally. The batteries died in about two minutes and the plane, due to its slow glide, landed lightly in a tree on the outskirts of town. We now use timers and no switches so there can be no repetitions."

Colorado

Mr. F. L. McFarland of 310 East Pikes Peak Avenue, Colorado Springs, Colorado, writes and gives us some highlights of gas model personalities in his section of the country. He says:

"Colorado Springs, Colorado, has the peculiar problem of high altitude, 6,200 feet, and that has presented many problems to overcome before we were able to get successful flights. Model and motor combinations that give excellent performance at lower altitudes are not always able to 'give out' here due to an approximate loss in wing efficiency and motor power to the extent of about 20% each.

"Frank Mercer and Maurice Simpson were about the first gas modelers in Colorado Springs, starting in quietly over a year ago, and they did not have very much success. Last spring the gas models were beginning to gain in popularity although little was known about them and the models selected were too detailed and impractical to do much flying. After building them a lot of experimenting was required to get them to fly properly because of the loss of lift and horsepower and the increased speed with which they flew.

"C. N. (Jack) Taylor is our champion builder here and has really done the most to advance gas model building here. He started out on Taylor Cub scale models and then built other models, each an improvement over the rest. He now has built at least twelve models and about three of his own design. He is probably the fastest builder you will ever meet; usually making a completely finished model in about a week of spare time of which he doesn't have too much, being the service manager of a local automobile agency.

"Our next builder of importance is Harold Cline. While not getting out as many models, he does the most precise work of any here and has two models powered with Brat and Husky motors that are really the veterans of all flyers. One model has made as many as twenty-two flights in an afternoon and has a total of more than four hundred flights to date and has suffered nothing more than very minor injuries.

"Jack Colp has been a faithful builder with several models to his credit. Jack is

LOOK FOR THE MARCH ISSUE
MODEL AIRPLANE NEWS
FEB. 8TH

unable to decide whether he wants to stick to the small or large bore motors, having built ships in both classes.

"Jimmie McDaniels is another modeler of unusual ability. His first model was washed out on its initial flight and was completely rebuilt and studied until it was made to perform perfectly and is now in use as often as he can get out to the airport.

"Kenneth Sewell and his father have turned out some swell jobs. They are out every Sunday the weather permits. The one model of their own design is probably the most stable model we have had here.

"Selby Young has his original model and it can be depended on for flights at any time. His model has had a hard life, is full of patches and looks like a Model 'T' belonging to some high school student.

"Eddie Cook has been building but late reports do not indicate how soon he will be finished.

"Lamar Kelsey is now on his second model and we are expecting to see him out with us soon.

"Tom Roark of Radio Station KVOR has built one of the smaller models and is now trying his hand with a larger model with the able aid of 'Cozie' Strang, who figures everything from an engineering standpoint.

"Donald Fee, one of our leading rubber-powered builders, has come into the gas class and we are expecting big things from him in the near future.

"Sparks Larson is designing a tailless model to be powered with a big motor and we have a feeling that we are going to be shown some real performance in the near future.

"Don Murray had built and flown one model and was preparing to start on the second when sickness forced him out of the game. We all hope for a speedy recovery and are holding a place on the field for him.

"Byron Medlock of Palmer Lake, Colorado, made a community project of a gas model. The boys turned out a beautiful job that went wild in the air, and came straight in for a couple hundred feet with power on. The motor wasn't damaged however. Byron was involved in an auto accident which has taken him out of modeling for a while. He is now remodeling his own framework."

Connecticut

Mr. Alfred Berry, publicity manager of the Waterbury Gas Model Club, 131 Cherry Street, Waterbury, Connecticut, sends the following report of this club's recent activities.

The 1938 Connecticut State Gas Model Meet was held Sunday, October 23, 1938, at the Waterbury-Plymouth Airport. This meet was sponsored by the Waterbury Model Builders Supply and the Waterbury Gas Model Club. Mr. Theodore Dove, official N.A.A. director for this area, was in charge; assisted by Edward Jann and Alfred Bailey of the Waterbury Model Builders Supply. Mr. Frank W. Schade, of New Britain, Conn. (N.A.A. director) came down and acted as timer.

There were 32 entries from all over the State. A crowd of about 1,000 persons witnessed the meet although the day was overcast and windy. A 30 second motor run was used. This was the first official contest in Connecticut since the gas model ban was imposed last Fall by Mr. Morris, State Aviation Commissioner. All Connecticut gas modelers are now licensed by the N.A.A. and Conn. State Aviation gas model rules. We are thankful for the cooperation of the State Aviation Dept., Beacon Falls State Police and the Waterbury Airport Corporation, who extended the use of the field free of charge, in order to promote interest in model aviation.

1st—John H. Taubel, Noroton Ave., Noroton Heights, Conn. Time, 1:59:2.

2nd—G. A. Bruce, 189 Glen St., New Britain, Conn. Time, 1:25:2.

3rd—William W. Withey, 49 Fairfield St., Manchester, Conn. Time, 1:24:2.

392 Per—In the Curtiss XP-40

(Continued from page 9)

ugal supercharger, the redesign of the liquid cooling system and the moving of the cockpit forward to its present position of vantage in the mid-point of the fuselage. This has been accompanied by a thinning-out of the fuselage aft of the pit and a resultant gain in streamlining of consequent speed increase. The wing has been faired more completely into the fuselage through the use of generous filleting practice of the wing leading edge into the fuselage. The wing is of all-metal, internally-braced structure built up on a main spar, two auxiliary spars and conventional rib and bracing wire truss. Ailerons are metal-frame fabric-covered, as are the cantilever tail control units: rudder and elevators. Flaps are of metal structure throughout and move down a full thirty degrees when necessary. Landing gear and tail wheel are both fully retractable, the main wheel moving through a longitudinal arc of ninety degrees in folding rearward and lying flush with the lower wing surface. The unit is of the single strut, pneumatic oleo type. The tail wheel folds to the rear and upward, the enclosure being completely sealed with retracting metal plates.

Power is supplied by an advanced type Allison twelve cylinder, Vee type liquid-cooled engine, model GV-1760-D1, developing 1620 horsepower at 3000 revolutions per minute. This power plant is Prestone cooled through the use of tubing conductors to the belly radiator situated just under the trailing edge of the wing. A small oil cooler is located just under the nose. Supercharging is obtained through the use of a gear-driven design anchored to the rear of the engine.

The ship is equipped with a Curtiss constant-speed three bladed, all-metal propeller, driving mechanism of which is fully enclosed in a polished metal nose spinner.

The pilot's quarters have been considerably revamped both in placement and accommodations. He is now located in the center of the fuselage and is completely enclosed in a sliding glass hatch. The standard Model 75 rear view glass enclosure has also been included in the XP-40 and extends rearwards from the main hatch along the sides of the fuselage. Within this latter enclosure are the main gas tanks, outlets to which have been made through this glass surface. Other tankage is in the wing, and oil storage is provided within the fuselage to the rear of the engine. The pilot is furnished with a controlled heat and cold air-conditioning system within the cockpit. Now the problem of wearing apparel, so difficult for summer operations, at which time it may be one hundred degrees Fahrenheit on the ground and below freezing at thirty thousand feet altitude, has been solved. Thus, average flying clothing may be donned and perfect flying comfort be maintained throughout the ship's altitude range.

A special command radio set built to United States Army Signal Corps specifications has been installed. This facilitates communication between planes in

the air and between group leaders and their command points on the ground.

Armament aboard the XP-40 has been considerably redesigned. The twin Browning model MG-53, fifty caliber machine guns, have been moved to the top of the fuselage, and barrel extremes are enclosed in long, streamlined fillets. The guns proper are mounted within the fuselage to each side of the instrument board, readily available to the pilot in the untoward event of stoppage or various mechanical difficulties. These guns, oddly enough, are Prestone cooled (through a spray injector mounted around the firing chambers), which, in turn, is cooled through the installation of a small radiator just preceding the pilot on the upper cowl.

A considerable reduction in weight has been achieved over the previous XP-37 model, the later type totalling a gross, fully loaded, of only 5,190 pounds, which includes fuel for a range of 625 miles. Vastly improved performance both in speed and climbing characteristics has been achieved. Official performance data has not, as yet, been released by the War Department, but confidential reports from members of the testing staff credit the Curtiss XP-40 with a top speed of 392 miles per hour and a cruising speed of 365 miles per hour. Absolute ceiling remains at 33,000 feet with service ceiling upped to 30,500 feet. The rate of climb has been reported as being close to the 6,000 feet per minute mark.

No official details of negotiations have been received but we have been informed that the Chief of the Army, President Franklin D. Roosevelt, who viewed this ship in its first public appearance at Bolling Field, Washington, D.C., has expressed great personal interest in the craft and is in favor of ordering the construction of a vast fleet of them as a national defense measure.

Such a step, insuring the formation of something like a dozen squadrons of these flashing aerial beasts, might temper the vociferous clamour of the dictators and put an effective damper on their war drums of defiance.

Build A Model Curtiss XP-40

Select a block of high grade balsa or pine 5-1/2" x 1" x 5/8" for the fuselage of our Curtiss XP-40 solid scale model. Trace the side view outline onto the block and cut with a band or small hand-saw. Next, trace the top view outline on the block and repeat the cutting operation. Take a razor blade (suitably installed in a well-guarded holder) and whittle off the rough edges until it approaches the true outline of the ship. Now, make templates from the fuselage cross-sections and place them at the indicated place, whittling off until the fuselage is just a shade larger than the template applied. The reason for this will be made obvious in a moment. Follow this for all five cross sections.

Take a grade of rough sandpaper and smooth the fuselage down, taking care not to gouge too deeply. Then take two pieces of balsa 3-1/4" x 1-1/2" x 1/4" and trace the outline of the wing. Cut to shape and trace the front outline. Cut to shape and follow the wing sections closely. Using a good tough grade of sandpaper, taper the wings as indicated, taking care that the finished product is slightly larger than your template. Follow this operation on the tail surfaces.

Now, before assembly, paint the wings and fuselage silver. After these are thoroughly dry, take a fine grade of sandpaper and sand them down, forcing the paint into the grain and smoothing the surface.

Paint, dry, and sand again. Apply the templates and make sure that the surface contacts them at the exact outline. After this apply a final coat of paint and you'll be surprised how smooth and even it will dry. Use small blocks of scrap balsa for carving the gun louvres and various cooling radiator cowls. The pilot's cabin is constructed of small wire or bamboo bent in a rough semi-circle and forced into the wood. A layer of cellophane is then glued over this structure. For final assembly, glue the wings and tail surface (elevators) using plenty of ambroid and making sure that the former have the correct dihedral angle and the latter have none. Wipe the evcess glue away and let the ship stand until thse parts are completely dried.

The landing gear is of extremely sturdy construction if the wheels are glued directly onto the retracting plates and are not made to rotate. Use small sheet balsa parts, carefully sanded, and build the landing gear up as shown in the drawings. Lay the model on its back and glue the main landing wheels into place. Next, glue the rudder on, after having painted in a single vertical blue stripe and alternate stripes of red and white as indicated. The propeller is built up of three lengths of balsa or preferably pine, and glued at the center and well sanded. Attach the tail wheel and mark rivet lines, aileron and elevator lines in black india ink. String radio wires from rudder to wing tips and your model will be complete.

Frontiers of Aviation

(Continued from page 17)

With a sharp nose and highly tapered wing it should be one of the fastest airplanes that we have today.

Just imagine a country with a fleet of these airplanes. They could fly across those "Maginot Lines" at high altitude, then drop down to tree-top level, drop their bombs and pour their machine gun spray over a town and be off again before the poor victims knew what happened. Just how could these so-called anti-aircraft guns be brought to bear on these planes just skimming over the roof tops? It just could not be done. The only preventative would be the use of sound detectors to warn of their coming and the immediate presence of pursuit planes or fighters of the Bell type to stave off the attack.

European countries have awakened to this fact, and their cry is for more aircraft. Ground troops have become just something to shoot at. Taking an example of the war in Spain, Mussolini expected to settle the argument over night when he sent a very modern mechanized detachment to help General Franco. The detachment became bogged down in mud and when some antiquated Russian fighters finished their work on them that certain Italian contingent had shrunk almost to the zero mark. Its trucks full of soldiers were sent spinning into the air one-by-one while the accompanying infantry was "mowed down" like hay. They had no shelter and there was no way for them to surrender to their air attackers, so they just had to wallow in the mud full of bullet holes.

Perhaps the future wars will not be as bloody as that for the objectives will not be human beings but the vital manufacturing, shipping, and gun powder points. An enemy would benefit more by dropping a few bombs on New York City's electric powerplants than shooting all the farmers in Kansas. An attack-bomber could shoot its way to its destination, then drop its bombs and be on its way.

Now that the argument recently staged in Washington as to whether a battleship is more potent than an airplane has been dismissed and forgotten, President Roosevelt has shown his desire to establish an air force of over 9,000 airplanes! The good note about this is that it has a very likely chance of becoming a reality. The President recently visited navy's Anacostia and army's Bolling Field to acquaint himself with the various military aircraft. The very latest designs were there . . . . even Curtiss's new P-40 pursuit! This ship is the last word in pursuit plane design and if built in quantity for the air corps it is said it will have counter-rotating propellers. An Allison engine is in the nose with the pilot sitting just aft of it and not far back in the tail as in the P-37 pursuit. It is a low-wing airplane and looks similar to the P-37. Just what happened to the P-38 and P-39 is still a military secret. As a guess one may be an Allison powered Seversky and the other a clipped-wing, Cyclone powered Curtiss pursuit.

Out of those 9,000 airplanes a goodly number should be attack-bombers. In time of war these planes, because of their small range, will have to be operated from foreign lands of our allies; and since any possible enemy will be 3,000 miles or more from us we cannot neglect the long-range bomber as Germany does. On the contrary. Douglas is now making rapid progress with that 250-foot giant bombing plane of theirs which will be able to cross the Atlantic, drop its bombs and return at a minute's notice. The plane is now well beyond the design stage.

But why this splurge for new airplanes? The trouble is that Europe is made up of too many small countries. The evolution of the airplane and its increasing use has even made the countries appear smaller. Pilots of some countries complain that they have difficulty staying within the border of their own nation on an ordinary flight. It is only natural that a union must take place, and there will always be unrest in Europe until it is accomplished. If history repeats itself it will be war that will make the union. Therefore every nation is laboring to guard its rights.

And the other question is why have we dwelt so much on the subject and what has it to do with the design of aircraft of which this series specializes? The reason is that the birth of a new type plane is about to take place; the twin-engined attack-bomber. Since the U.S. Army Air Corps has objected profusely to the publication of any specific design details on these new creations we have given you the story so you may draw your own picture as to the design of these new planes. The forthcoming

competition should thus prove to be of more interest to you. Then there is another question. Will the plane ordered boast more of load carrying capacity or high speed? As to that, we shall have to wait and see.

Vultee is busy working on new designs these days and one may be entered in the aforementioned competition. Phillips Aviation, who built the famous Aeroneer, has also entered the attack business, but their plane will be a light single-engined ship for export. It will be powered by a 450 hp. Ranger engine and have three machine guns as well as a crew of three. Of very good lines, it is a low-wing all-metal plane grossing about 3,525 pounds. Top speed is in the neighborhood of 205 m.p.h. More news on the plane will follow.

Phillips have just received an approved Type Certificate on their new product formerly known as the Western Pirate. The rejuvenation in design of this plane was done by Howard Hughes' company. It is a conventional two-place biplane powered by a 96 hp. Menasco engine.

Seversky is going to build a new four-passenger low-wing single engined airplane designed after the "Executive" model. A stainless steel keel will be incorporated in the belly to hold the plane in one piece in case of an emergency belly landing. An exceedingly well cowled 1,200 hp. Pratt & Whitney Twin Row Wasp will supply the power in the nose. A nose wheel and Fowler flaps will be two new Seversky features. Otherwise the airplane will resemble former Seversky aircraft. The plane is expected to top 330 m.p.h., but then Roscoe Turner could not do that even in his racer with the same engine. Frank Fuller, the 1937 Bendix Race winner, is scheduled to own the first one. The tricycle landing gear, by the way, is retractable.

In this topsy-turvy aviation world strange things are always taking place. While Lockheed strives to build larger airplanes, Douglas is doing the reverse in regards to the commercial phase of the industry. The new DC-5 will carry only eighteen passengers and Lockheed's new transport on the ways will be a twenty-four seater! The DC-5 as well as the Lockheed will have nose wheels.

From Kansas City there is the possibility of two new aircraft forthcoming. They are to be built under the guidance of a Mr. Beal, it is said, and will be very radical. One is destined to be a flying wing; both will be sport-planes.

From "American Aviation," we hear that Howell Miller, who built "Time Flies," is about to test fly a new twin-engined pusher of his powered by two 125 hp. Menasco engines. The plane will carry four passengers and will be used for feeder-line service. It has an all-wood wing with plywood covering and the fuselage is of steel tubing construction. The designation of the plane is HM-4. The two-place Miller Zeta low-wing monoplane has been revamped and will try for its A.T.C. shortly.

In England we hear that Handley-Page may build a giant four-engined land transport, while in France a Payen Flechair racer is in the making. It is powered by two radial Salmson engines in tandem style geared to counter-rotating propellers. The leading edge of the stabilizer projects so far forward that it fairs into the wing fillet! The pilot sits well in the rear and forms part of the fin area. The wing does not have much more area than the horizontal tail units and is slightly gulled. The plane is of mid-wing design and should prove to be much faster than any racer we have in the Menasco powered class if it goes through tests without a mishap. Skeptics please note. The results of the forthcoming revived Deutsch Coupe Race should tell the tale. Bugatti also has a new super-racer in the making for the same race.

A new twin-engined fighter is under construction by the Arsenal at Villacoublay in France. Known as the V.G. 50, it is single-place with one engine in front and the other at the rear of the cockpit and connected to two co-axial counter-rotating propellers! The shaft of the rear engine must run between the pilot's legs to the props. Sandwiched between two engines, the pilot receives good protection in time of battle.

Designed to take the new Warner engines of about 165 hp., the new twin-engined Cessna is rapidly nearing completion. It is of low-wing design, carrying five people and very closely resembles the lines of the Lockheed "12". Specifications follow:

Wing-area—296 sq. ft.; Weight empty—2,350 lb.; Gross weight—4,300 lb.; Top speed—175 m.p.h.; Cruising speed—157 m.p.h.; Landing speed—55 m.p.h.; Service ceiling—20,000 ft,; Range—1,000 miles.

How to Build a Scale Model of the Twin-Engined Cessna

If you wish to square-off the accompanying three-view for easier measuring connect the corresponding dashes on the border with sharp, straight pencil lines. Each square will equal one square foot. The model is to be made entirely of balsa wood which may be purchased from any supply company mentioned in MODEL AIRPLANE NEWS.

The model is to be made in the following parts: Fuselage, left and right wing panels, two fin-rudder pieces, horizontal tail surfaces, tail wheel, two engine nacelles and cowls, and two three-bladed propellers. Make the fuselage first. Draw the outline

of the top view and cut with a jig-saw. Be sure that the grain of wood runs lengthwise. Go over the sides with coarse sandpaper and then draw the side view on stock in the correct position. Saw around the outline once more.

As illustrated by the accompanying cross-sections, shape out the contour of the fuselage with a sharp razor blade. Sand down the surfaces with coarse and then fine sandpaper.

Next make the two wing panels. Draw the outline on stock and cut to shape. With a flat sharp chisel, taper them as shown by the front view. Then finish up the wing as shown by the airfoil sections. Be careful and take plenty of time. Go over the surfaces with coarse sandpaper to remove all roughness and then rub them to smoothness with fine sandpaper.

The remainder of the parts can be made in the same manner as the fuselage and wing panels. In this particular model the retracted wheel and the nacelle may be carved from one piece and a small stand may be either made or purchased to hold the model in flying attitude. After all parts have been completed and well sandpapered brush off all dust and begin the assembly.

Lay the fuselage in flying position on a flat surface and join the wing panels in place with model cement. Put blocks under the wing tips to hold the correct dihedral. While the connections are drying join the fin-rudder pieces to the stabilizer and then cement them to the fuselage tail. Slip the engine nacelles on the leading edge of the wing with cement to hold them in place. Join the tail wheel next, using a single piece of stiff wire as a cantilever strut. The propellers may be joined to the nose of the cowls with straight pins so that they may spin.

Go over all joints with model cement followed by a good sandpapering. Brush off all dust before you begin the paint job.

The Physics of the Airplane

(Continued from page 19)

flies at a fast rate, the energy when suddenly arrested does not dissipate in a gradual manner, and as a result the structure must absorb this. Consequently, the structure is ruptured and fails. The same thing may be said for the instance where test pilots dive military aircraft to terminal velocity and then attempt a rapid recovery. The energy, both kinetic and potential, cannot be arrested suddenly, and as a result the wings are sheared off. When the airplane must decelerate for a landing it has been found that an airplane with plenty of side area and excess parasitic tends to slow down quickly when side slipped, but that an airplane with a high fineness ratio is difficult to sideslip and considerable time expires before the kinetic energy is entirely dissipated. Largely because of this recourse has been made to supplementary lift and drag appendages to the wings. See

Figure 1.

Potential energy is easily measured. It is equal to the work which has been expended in raising a body to some specific elevation.

Potential Energy = Weight × Height

The answer to this question is in foot pounds. Now is the body after it has been raised is allowed to fall, the available potential energy is converted into kinetic energy.

The subject of kinetic energy is somewhat more complex. In the investigation of what constitutes kinetic energy of a body, we must consider the work which is expended upon the body until it attains a specific rate of translation. If the body is arrested in its motion, the kinetic energy must be dissipated before the body will come to rest. The amount of energy which is dissipated will be equivalent to the work imparted upon the body in attaining translational motion.

When a body begins to move from a state of complete rest the distance which is passed over in a specific interval of time is equal to:

Distance = ½ × acceleration × $(\text{Time})^2$

The final derivation of the various equations which develop the formula for the kinetic energy of a body resolve themselves down to this form. Kinetic Energy = Weight in lbs. × $(\text{Velocity in F.P.S.})^2$ / 2×32.2

This equation gives the foot pounds of kinetic energy of a moving body. The expression of 32.2 is the gravitational acceleration constant. The number 2 in the equation is the factor which permits the average kinetic energy to be determined. Of equal importance is the retarding force or loss of kinetic energy. The loss of kinetic energy is equal to: Loss in Kinetic Energy = Retarding force × Distance

If an airplane which weighs 2,000 pounds lands at a velocity of 88 f.p.s. (60 m.p.h.), how far does the airplane roll before attaing a state of rest? The retarding forces total 200 pounds, including the brakes, drag, friction of the runway and the wind. Solving:

$$\text{Loss in Kinetic Energy} = \frac{2{,}000 \times (88)^2}{32.2 \times 2}$$

$$= 200 \times d$$

$$d = \frac{2{,}000 \times 7744}{32.2 \times 400} = 1202.4 \text{ ft. rolling distance}$$

Kinetic and potential energy being interchangeable, the sum of the potential and the kinetic energy is the same at any point along the trajectory of a gliding airplane. To a large degree the kinetic energy contributes safety when the conventional power driven airplane flies, since if the airplane is inadvertently stalled, the kinetic energy present will carry the machine uward to a great height before the energy is finally lost. In the case of a sudden stalling such as this it allows the pilot sufficient time to recover control. On the other hand, the kinetic energy of a glider is comparitively low on account of its light weight and its slow speed. Gliders show tendencies to stall very easily and cannot climb on their inherent momentum alone such as an airplane can easily do for a limited distance.

Another example to illustrate the principle of the transfer of potential energy in a back and forth direction in which we call oscillation. If the air plane is disturbed on its lateral axis, the wings will oscillate back and forth until the disturbance which caused the instability is dissipated. The wings may sway back and forth in a rapid or slow rate until normal recovery is assumed. When a wing tip reaches the maximum of the amplitude of the oscillation, it has not any more potential energy left, but as it returns to normal it acquires a limited amount of potential energy. This pendulum action continues until the damping forces in the lateral plane restore normal lateral wing position.

Another example of kinetic energy is evidenced in the ejection of exhaust gases from the exhaust manifold of an airplane engine. On account of the high velocity with which these burnt products of fuel combustion emerge, the gases and flames tend to shoot out for a considerable distince from the end of the exhaust stack. The energy of the ejected gases can be made to drive an impeller vane, which in turn drives a supercharger impeller. This is the basic theory of the driving mechanism of a supercharger impeller of the turbo type, and since this kind of sueprcharger functions from the engine exhaust, it consumes less HP. to supercharge than the conventional centrifugal impeller type, driven off the auxiliary drive of the airplane engine. See Figure 2.

So far in this series of articles we have explained many examples where physics directly apply to the performance of the airplane. Note that since this is the case the great importance of the relation of physics and the modern airplane.

Glossary

Fluid Characteristics: Air is considered as a fluid because it exhibits a tendency for the particles to easily move and change their relative position without what may be termed a separation of the mass.

Coincident: That which is concurrent.

Gyrate: The revolution about a central point.

Acceleration: To quicken the ordinary progression of progress of a moving body.

Inertia: The property of matter by which it will remain at rest or in uniform motion in the same straight line or direction unless acted upon by some external force.

Tangential: The meeting of a curve or surface at two or more consecutive points and having there the same direction as the curve or surface. This may be applied to two curved surfaces or a straight line and a curved surface.

Phuyoid: Instability evidenced by pitching motions along the fore and aft axis.

Wing Root Fillet: A special curved fairing or surface which joins the wing and the fuselage together. The function of the fillet is to merge the flow of the wing and the fuselage together into one flow. This tends to reduce the interference drag at the wing root.

Buffeting: A peculiar vibration of the empennage and which affects the airplane along the fore and aft axis. It is a result of poor design and improper distribution of the slip stream, the downwash and the wing root interference.

Oscillate: The fluctuation of a body between specifically fixed limits, or to vibrate

above or below some mean value.

Magnitude: An expression of quantity by which the quantity may be compared to other quantities, or qualities of a similar nature.

Parallelogram: A quadrilateral with opposite sides parallel and therefore equal. It is used frequently in stress analysis.

Strut: A structural member designed to resist compressive stress in the direction of its length. Its resistance and strength is a function of the cross sectional disposition of the material and its slenderness ratio.

Space Framework: A structure composed of struts arranged so that the sum of all of the resultants of the forces is zero. Steel tubing airplane fuselages are known as space framework. The structure may be determinate or indeterminate.

Equilibrium: A condition or state wherein all the forces are in a complete state of balance or the summation of all of the forces is zero.

Space Diagram: A graphical drawing of a space framework wherein all of the forces are represented by lines.

Force Diagram: A graphical drawing of a space framework wherein all of the forces are drawn to some selected scale and represented by lines.

Stress Analysis: A mathematical investigation which determines the strength and the resistance of a structure and the characteristics and properties of the materials and disposition of materials when subjected to varying loads.

Dynamometer: A mechanical device of laboratory nature which is used to measure the horsepower output of an internal combustion engine.

Internal Combustion Engine: An engine in which a hydrocarbonaceous fuel is injected into a cylinder. The fuel is atomized and mixed with air, compressed and then fired by an electric spark. The mixture may also be fired by compression ignition in which case the internal combustion engine is known as a Diesel.

Terminal Velocity: The limiting speed of an airplane in a vertical dive where the weight is equal to the drag.

Decelerate: The act of slowing down or to dissipate kinetic energy.

Translation: The movement of a body through space.

Trajectory: Spoken of here to mean the curved flight path of gradual nature of an airplane gliding to a landing.

Air Ways

(Continued from page 26)

a complete history of model airplane activities covering a period of nearly ten years. This should be of great value in years to come.

Picture No. 3 shows Linn's Wakefield model which won first place at the Kansas State Contest with an average time of 1 minute, 53½ seconds. Its best flight to date is 3 minutes, 55 seconds. The wing span is 47¾ inches. He says he designed it with the aid of articles on design which have appeared in MODEL AIRPLANE NEWS, and that it is the stablest and most consistent

flying model that he has seen. It is powered with a 32 strand motor, forty-eight inches long. This plane also placed second in a contest at Eldorado, Kansas.

Picture No. 4 shows the framework of a ship built by Donald Coles, and is one of the most beautiful designs we have seen. Coles says that this plane is one of a number which he has built incorporating superstreamlines. His first plane of this character had a span of 44 inches, area of 199 square inches and weighed 6 ounces. It won first place in the Minnesota National Air Mail Week Contest. However the ship cracked up in the Endurance Event due to the fact the nose block was put in upside down on its first official trial. This might remind readers of some of the mistakes they have made under the excitement of contests.

Coles says that the plane shown in the picture shows a slight tendency to be laterally unstable and tail heavy. He says possibly this is due to the low dihedral and to minus two degrees angle of incidence of the tail, which is a Clark Y section. He wishes to know if increasing the incidence to plus one or two degrees would help matters. Unquestionably the lateral instability is due to the fact that there is too much fin effect relative to the amount of dihedral used. The cure for this is to either increase the dihedral or decrease the fin area. We suggest trying an increase in the dihedral first.

Fundamentally the stabilizer is too negative, considering the fact that the wing has approximately five degrees angle of incidence. This incidence in the wing will work out satisfactorily if the stabilizer is set at plus two degrees. Under these conditions the plane should show remarkable stability and have a flat glide.

Model News from Other Countries

Portugal

Mr. Ed. vonHafe of Rua Dr. Miguel Bombarda 243, Porta, Portugal, has been spending considerable time in building Wakefield jobs. Picture No. 5 shows one of his recent planes; the design of which is similar to the Wakefield plane appearing in the June 1938 issue of MODEL AIRPLANE NEWS. The span of his plane is 46 inches, with an average chord of 5 inches. It has 207 square inches of area. The wing section is an RAF 32. The fuselage was hollowed out from two solid pieces of balsa which were glued together when finished. Mr. vonHafe says this made the model quite heavy; the total weight being 11.6 ounces. In spite of the fact that there was no freewheeling and no rubber tensioner, the model flew extremely well; the maximum time being 1 minute, 35 seconds. Its minimum time was 1 minute, 28 seconds. These times were registered during six consecutive official flights and show unusual consistency in flying time; with only seven seconds difference between maximum and minimum.

Mr. vonHafe says he is now building a planked fuselage in order to reduce the weight. We suggest that in planking his fuselage he use extremely light balsa wood of a thickness not greater than 1/16". This should be sanded down to a thickness of about 1/32" so that the surface is very smooth. His plane was originally powered with sixteen strands of 3/16" brown rubber. However he believes better results

will be obtained by using 25% more rubber. The original model which appeared in MODEL AIRPLANE NEWS and which served as a basis for Mr. vonHafe's design, weighed only 8¼ ounces. If vonHafe's model can be reduced to this weight the performance should be increased to a remarkable extent.

Australia

Mr. J. Billing of Penola Road, Mt. Gambier, South Australia, wishes to know something about the design of planes for compressed air motors. Probably the best designs for this type of motor would be the planes which are now being designed for very small gas engines. Such planes should be lightened up in every way possible. A plane of about 36 inches to 48 inches wing span would carry a compressed air motor of normal power very nicely. However, unless you have good strong arms and do not mind pumping up the air tank after each flight, we suggest that you obtain a small gas engine.

If this is rather expensive for you why not get two or three other boys to club together with you, and purchase the engine as a group? Each one can build a plane. Then, if the engine is mounted on a demountable hanger the motor unit may be used in each one of the planes when anyone of the group wishes to fly.

A demountable motor is very handy; it may be taken out of one plane and put into any other quickly and easily. In such cases the motor, coil, batteries and motor accessories are mounted as a unit on two stringers, which form a cradle. The whole unit on the stringers fits on to a track in the fuselage of the model. When it is inserted small clamps or pins will hold it in place.

England

Mr. P. Peach of 58 St. Edmonds Street, Northampton, England, who is President-Secretary of the Northants Model Aero Club, says that many members of this club are regular readers of MODEL AIRPLANE NEWS. The club membership at present is over 100, which is divided up into three sections. To date the members have won five trophies. They boast their own private flying field and in a recent contest there were over 100 entrants from surrounding towns. Mr. Izzard of Northampton won the Duration Event with 2 minutes, 9.7 seconds. During the winter a busy program has been laid out, which includes the showing of motion pictures of planes and contests and lectures by D. A. Russell and H. Boys.

We extend best wishes to our English friends for a very successful season.

Canada

Mr. Frederick Hanmore Jr. of 205 Essex Street, Sarnia, Ontario, Canada, would like to correspond with model builders about seventeen years of age who live in England, Australia or the United States; preferably in England.

New Zealand

Mr. Gordon P. Smith of Broughham Street, New Plymouth, New Zealand, sends us a comprehensive outline of model airplane organization in New Zealand and some results of the contest held recently. The contest mentioned is the Southern Districts (North Island) Model Aeroplane Association Annual Labor Day Rally. It was held October 22nd, 23rd and 24th at Palmerston North, under the auspices of the Southern Districts (North Island) Model Aeroplane Association. Mr. H. E. Righton of Wellington is the secretary. The report follows.

First of all an explanation as to what the Southern Districts Model Aeroplane Association is. Pull out those old school atlases of yours, and fine New Zealand, (it's a small island—of mighty works—"down under"). You will see that there are two main islands, the North and the South. Well, the whole is controlled by the New Zealand Model Aeroplane Association with its offices in Auckland. (This city you will find in the narrow neck of the North Island about 1/3 way down.) Affiliated to this body are three district associations which control activities in those districts. There is the Northern Districts (North Island) M.A.A.; there is the Southern Districts (North Island) M.A.A.; and then there is the South Island M.A.A. Of these three the second one, or the Southern Districts (North Island) seems to be the most active. For the last three or

(Continued on page 62)

Notice

Earl Johnson of 4654 Superior Street, Chicago, Illinois, writes he will give a reward for information leading to the recovery of an eight foot span yellow monoplane powered by a new Forster motor, No. A-1999. On the fuselage was a Central Gas Modelplane insignia. This plane was stolen on November 6, 1938, near Chicago, after completing a fine flight.

four years every Labor Day week-end they have arranged a most attractive and splendid meeting, though unfortunately the weather gods have not always been too kind.

Now you may wonder what Labor Day is. Well this is to commemorate a reduction in the hours worked in shops, etc., in New Zealand, when the maximum hours were reduced to 48 hours per week. Labor Day has been observed for very many years. We have no day of commemoration to remember the last reduction to 44 hours maximum with our now 40 hour week.

Now take that atlas again and right in the center of the North Island you'll see Palmerston North. Well, that's where the boys congregated for the big contest.

About 104 attended the meeting with approximately 460 models, included in which were 53 petrol driven jobs (gas jobs to youse guys). The weather was generally calm with intermittent showers and quite a few thermals knocking around. The standard of flying was a great improvement on the previous years; especially in the gas events, where nearly every model got into the air and only two write-offs out of this huge total. The Wellington M.A. Club concentrated on the rubber side and gained the bulk of the prizes in this, to uphold their reputation as the Chamion Club of New Zealand, not only the Southern Districts.

This contest in New Zealand corresponds to our Nationals in America, and is exceedingly well organized. A large number of prizes were given to the various winners.

CLUB NEWS

New York

Mr. Harold W. Kulick of 256 Wadsworth Avenue, New York City, sends us some pictures and a report of the Metropolitan Model League Council's recent contest. This was held at Central Park, New York City, on October 29th. The report is as follows:

The Metropolitan Model League Council held its first meet at Central Park "Sheep Meadow," under the auspices of the N.A.A. There were three events—Glider, Rubber Powered Stick and Cabin Models.

The meet started at 10 A.M. and lasted till 4 P.M. The sky was clear and the weather was perfect, except for a brisk wind. However this wind helped Herbert Friedlander, a member of the M.M.L., set a new Class B Glider record with a new time of 2 minutes, 58 seconds. Friedlander was also "top prize man," placing in the Stick and Cabin Events first and second respectively.

A good many ships were lost among the towering skyscrapers of New York City, the wind carrying them out of sight. The spectators were an interested group of people living in this section of the city. Many of them had never seen models in flight and marveled at the spectacle.

There was a bit of controversy caused by George Brown of the Jersey Air Wheels, who wished to enter his stick in the Cabin Class. Because his ship could not meet qualifications he was refused. By tying a balloon to the stick he met with the qualification, but caused argument because the balloon was not considered an integral part of the fuselage. Final decision rests with the N.A.A., but his flight was disqualified by meet officials. The results were:

Respective winnérs in the Glider Class B Event, and their times, were: Friedlander, 2:58; Henry Nelson, 2:45; Ogilivie, 1:58; Archiapanti, 1:19; Murray, 1:19.

Stick Event winners and their times were: Friedlander, 4:11; Brown, 3:00; Ehling, 2:32; Hanes 2:01.

Cabin Event winners and their times were: Minarsia, 3:30; Friedlander, 2:53; Murray, 2:43; Ehling, 2:21.

Picture No. 6 shows some the winners of the contest.

Picture No. 7 shows George Brown of Jersey City, with his stick model which he entered in the Cabin Class. You will note the balloon which he attached to the stick. He claimed that this, when blown up to the correct dimension, fulfilled the Cabin cross sectional requirements of the N.A.A. rules. However he was ruled out by the officials, and rightly so.

The rule clearly states that: "The fuselage shall be a structure which supports the motor, wings, empennage and landing gear."

In no way can the balloon be considered a structure or an integral part of a structure which performs this function. Tying a balloon to a stick does not make it an integral part of it; nor is it an essential part of the structure.

The most discouraging part of this incident is the display of spirit which would prompt a model builder to follow such a procedure. A model contest is supposed to be a sport event; model builders are supposed to act in a sportsmanlike manner and follow the spirit of the rules. After all, mere words and technicalities are very often an imperfect expression of the intent and spirit which should govern meets. When a model builder follows technicalities rather than the intent and spirit that dominates the contest, he merely admits that he is not good enough to win the contest by acting in a sportsmanlike manner, but has to cut corners that will give an advantage that will put him in a winning position.

Basically, the important point is not to just win a contest. This may contribute to the momentary pleasure and prestige of a contestant; but it does not necessarily fortify him with those qualities which will make him a success in life. Fundamentally, contests are staged so that the contestant will acquire a spirit of sportsmanship, develop his knowledge and generally gain qualities which he may use to advantage later in life.

The distressing point about contests is

general, as held at the present time, is that these things are not made clear to contestants. Very often it is difficult for a contestant to understand the struggle that lies ahead of him in life, because now everything is sailing along smoothly and he lacks the imagination to understand. Those who are wise acquire their ammunition in the form of knowledge and character so that they will have the means of solving problems successfully when they have their way to make in the world.

We are very happy to say that incidents in which model builders take advantage of technicalities in rules or apparent weaknesses in order to gain advantage over contestants, are few and far between.

Florida

Lawrence H. Raley, secretary of the Jacksonville Model Airplane Club, Jacksonville, Florida, writes and tells us that the club was reorganized October 19th. It is under the new direction of Mr. Nathan Mallison, head of the Recreation Department, with Mr. Theodore Weeks as Assistant Director. The officers remain the same as prior to the reorganization. They are: Milton Myers, president; Theodore Everett, vice-president; Lawrence Raley, secretary and treasurer.

The club gives promise of greater activity than ever before and hopes to be one of the leading clubs in the Southeast. They are looking forward to a very active 1939 season.

Pittsburgh, Pennsylvania

Mr. Harry G. Vogler, director Aircraft Division, Boys Club of Pittsburgh, 4412 Butler Street, Pittsburgh, Pa., sends us information of the fifth W.P.A. contest. The report follows:

Out of a field of over fifty entries into the fifth Works Progress Administration Scale Model Airplane contest, held at the Boys Club of Pittsburgh, on the twelfth of November, the judges had one "merry old time" selecting the best ships. After nearly three hours of mediating the judges selected the following as the prize winners in both divisions.

Senior Division

First place: Michael Conrad, Logan Street, Millvale, Penna., Aero Club Trophy.

Second place: Alex Szwajnowski, 144 43 1/2 Street, Pittsburgh, Penna., Gimbels Award (De Luxe Denny Kit).

Junior Division

First: John Kowalcik, Jr., 5223 Duncan Street, Pittsburgh, Pa., Beshar Award (Corsair Gas Kit).

Second: Wm. Engle, 3922 Liberty Ave., Pittsburgh, Pa., Megows Award (Cardinal Gas Kit).

In the field of models were types from the Spad 522 (Paris Defender), to the newest creation in aeronautics; a model of the new Atlantic Clipper, designated as the Boeing 314. Also types in the fighting field from Boeing f4B4's to P-26-A's and Curtiss Swifts to Loire Nieuport Fighters "46."

Entries were from the different environs of the Pittsburgh area.

The judges had no easy time selecting by points the plane that should be awarded the McKee Trophy, which was made available by the Aero Club of Pittsburgh, for the most authentic model entered into the contest. This ship had to be as close as it were possible to build any model and a point system was used in determining the winner. After much deliberation by the members of the judging board, a Boeing P-26 was matched against a Navy Vought V-80, and in the finals the race was very close. However, the Boeing P-26 won the decision, due to the fact that there was only one bought part on the plane; while the other lost points in that and on the color scheme. The Boeing P-26 also had authentic squadron markings and stripes that were painted on by hand, and the designations were true to authenticity.

Philadelphia

The Philadelphia Model Airplane Association of 1427 Spruce Street, Philadelphia, now boasts of an organized newssheet, which is edited by the club's Field Director, Victor R. Fritz. Scholarships are being given by the Association to scale

model builders.

All such applications for scholarships to be awarded the winners of the Flying Scale Model Division had to be submitted to Mr. R. S. Milne, Aircrafters, Scholarship Committee, Naval Aircraft Factory, Navy Yard, Philadelphia, Pa., not later than November 15th, 1938.

Allentown

Russell K. Fahringer of 717 Greenleaf Street, Allentown, sends us a report of the active model club in his community. He says:

"The Flying Keystone Model Airplane Club, Allentown, Penna., held the first of a series of indoor meets Saturday afternoon, November 5th, in the High School Gym.

"Elwood Matten, president of the club, established a new local record for the Helicopter in the Senior class with a time of 1 min. 31.4 sec. A N.A.A. Certificate of Merit was presented to him for this record by Mr. Robert H. Kleckner, president of the recently organized Glider Club of Allentown.

"The results for ROG: George Micott, (B) 3 min., 54.6 sec.; Charles Wieder, (B) 2 min., 21.2 sec.; and William Barba, (A) 1 min., 24.8 sec.

"Tractor: Charles Wieder, (B) 4 min., 41 sec.; and George Micott, (B) 4 min., 6.2 sec.

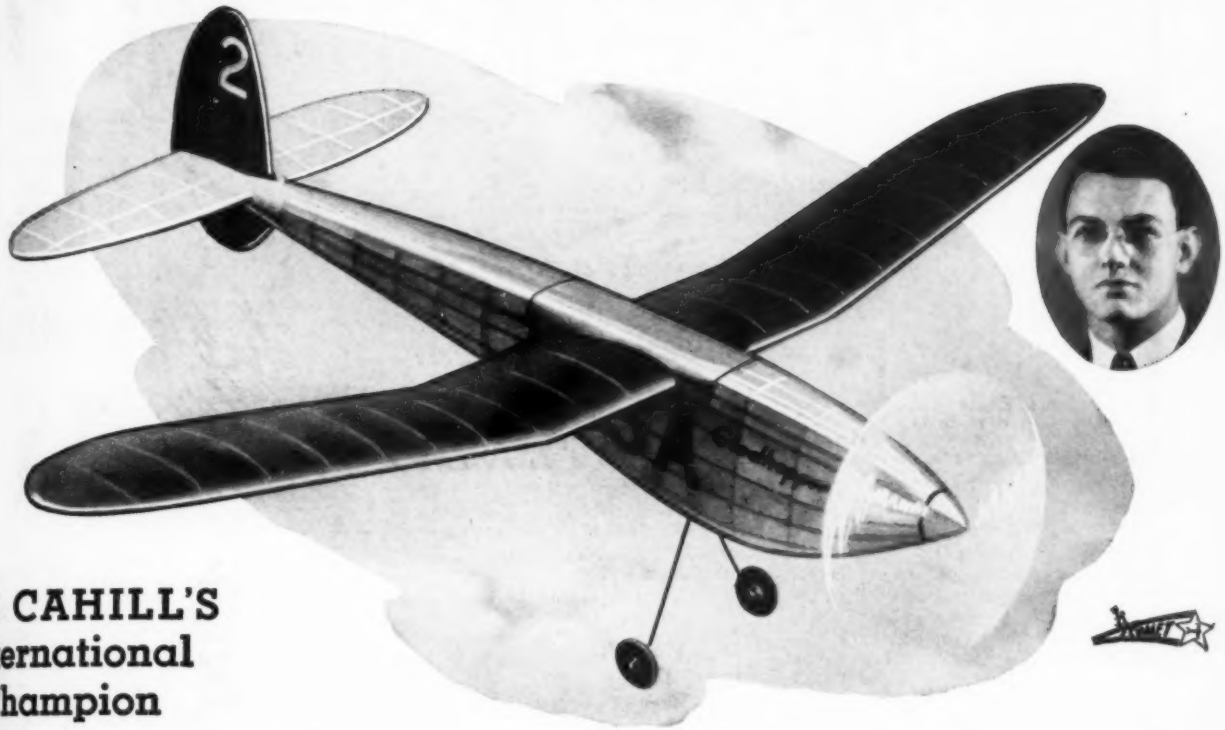
"Glider: John Waidelich, (A) 11.4 sec.; Elwood Matten (A) 8 sec.; Robert Metzger, (A) 6 sec.; and Richard Metzger, (A) 1.6 sec.

"The director, Ernest Schaffhauser, has placed a beautiful plaque into competition, to be awarded to the member who earns the greatest number of points in the series of six monthly indoor meets. The standing at the end of the first meet for the "Director's Plaque" are as follows: Elwood Matten, ten points; Charles Wieder and George Micott, nine points; William Barba and John Waidelich, five points; Robert Metzger, four points; and Richard Metzger, three points.

"An indoor meet was held December 10th, and the first of the Solid Scale Model contests was held December 22nd."

ITH A WORLD OF PRIDE—YOUR

COMET DEALER *presents*



M CAHILL'S
nternational
Champion

CLODHOPPER II

71/2" Wingspan—and 32" Long!

Winner of American and World Competitions!

Complete Kit Only **$1.00**

True Comet Quality

IF EVER a model had a right to the title "Champion of the World"—it's Jim Cahill's sensational CLODHOPPER II. Designed by Jim Cahill, captain of America's 1938 Lord Wakefield Team, this model won the MOFFETT TROPHY, America's leading yearly model competition; the AMERICAN ELIMINATIONS against all the best models produced in America this year (which won Jim Cahill his appointment as captain of the American Team)—and finally the LORD WAKEFIELD TROPHY, the most important model competition in the world. Against the best that leading builders from every country could produce, Cahill's model won by a wide margin! Jim Cahill himself has given his approval to the Comet Kit and plan for his CLODHOPPER, and Comet has given it the best in quality, and the utmost in completeness! Now, your Comet dealer offers you this newest and greatest thrill in model building—see it today—you'll call it the biggest value you've ever seen at..... **$1.00**

Postage 15c; none if ordered from dealer.

EW! *the* "AERONEER"

...r 40½" wingspan model of a dashing sport ...l. Exact scale, 1¼"-1'. New motor roar ...; movable controls, shock-absorb-...rials. A remarkably complete kit, ...sensational value at only..... $1.00

...ge 15c; none if ordered from dealer.

Kit No. P-6

JUST OUT!

NEW 36 PAGE CATALOG!

Filled from cover to cover with descriptions and pictures of the kind of kits you like to build—many sensational new models—every one an outstanding Comet value! Beautifully printed in colors, 5c.

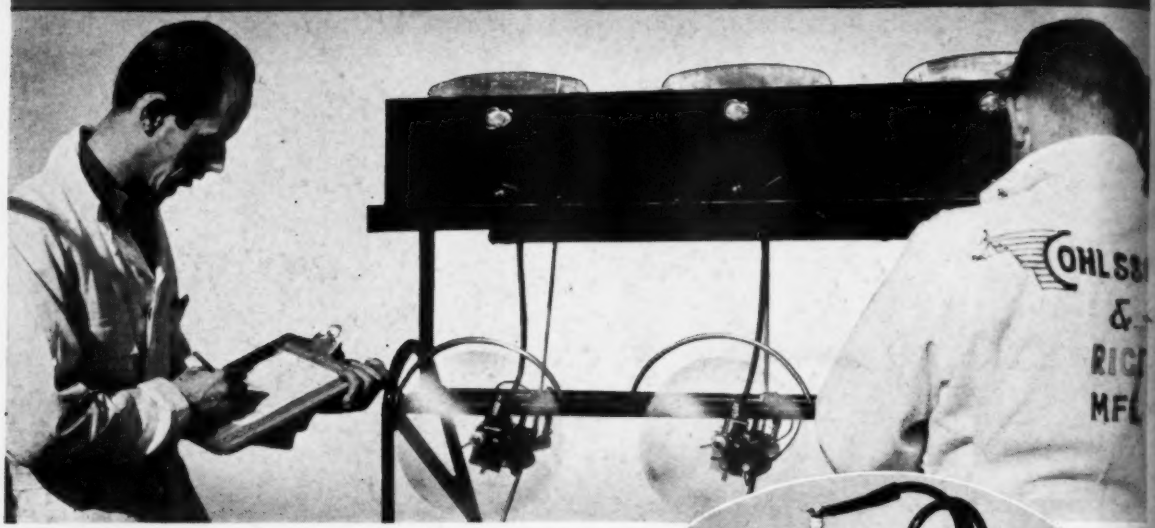
COMET MODEL AIRPLANE & SUPPLY COMPANY

2509 West Cermak Road, CHICAGO. Dept. MN2. Eastern Branch: 688 Broadway, NEW YORK

COMET maintains distributors in many cities throughout the United States and other parts of the world. Foreign distributors include: F. P. Sweeten, Blackpool, England; E. J. Hyams and Son, Wellington, C. I., New Zealand. PACIFIC COAST DISTRIBUTORS: Edw. Kapitanoff, 4649 Prospect Ave., Los Angeles, Calif.; Smalley Paint and Paper Co., 5300 Ballard Ave., Seattle, Wash.

COMET MODEL AIRPLANE & SUPPLY COMPANY
2509 W. Cermak Road, Chicago. Dept. MN2. Eastern Branch: 688 Bway., New York, N. Y.
$1.00 complete. Postage 15c; none if ordered from dealer.

200 HOURS WIDE OPEN
and still running!



Ohlsson "23" Sets New World's Endurance Record
*without replacing a part!**

This sensational demonstration of Ohlsson stamina, of Ohlsson superiority of design and construction, was made possible only through the use of such Ohlsson features as:

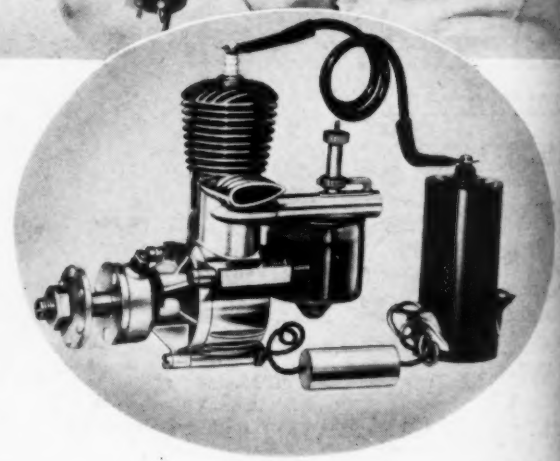
HARDENED MONO-STEEL PISTON—New high turbulence type providing greater power, efficiency and long life.

OVERSIZE BEARINGS—The largest bearings on any miniature airplane motor in the world.

BALL BEARING THRUST BEARINGS—eliminate drag, increase power, provide positive main bearing lubrication and longer motor life.

ONE-PIECE CONSTRUCTION—Absence of superfluous parts, less vibration, more positive and even power output.

*** Spark plugs replaced when necessary.**



See your nearest dealer today

and ask him to demonstrate the "Ohlsson 23." Write for new two-color illustrated booklet giving complete description and specifications of both the "Ohlsson 23" and "Ohlsson Gold Seal."

FLASH!

OHLSSON GOLD SEAL AND 23 PLACE FIRST AND SECOND PACIFIC COAST CHAMPIONSHIP MEET LOS ANGELES, DECEMBER 11TH.

OHLSSON MINIATURES
630 NORTH ALVARADO STREET
LOS ANGELES, CALIFORNIA